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ABSTRACT

Numerous models have been developed to analyze the relationship between adult education, adult learning, and adult development. Squires' contingency model postulates that the how of teaching is determined by the nature and characteristics of the participants (the who), the content (the what), and the setting (the where) in which teaching takes place. In contrast, the noncontingency model postulates that, irrespective of the aforementioned factors, teaching must adhere to fundamental principles or laws relating to the nature of learning itself. The noncontingency model is the basis for four schools of thought regarding education: the behavioristic, cognitive, information processing, and humanistic approaches. Two metaphysical models of development and learning--the mechanistic and organismic models--have also been used to explain the sources of human motivation to change and learn. These models have in turn given rise to many models and theories of adult development and learning. (This document examines the following models: the biological, growth, maturational model; the stability model; the decrement-stability model; the ordered change model; the dialectical model; the contextualist-aleatory model; the life span development model; and the adaptive model of adult cognition.) (MN)

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The University of Hull
Department of Adult
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# ADULT DEVELOPMENT, LEARNING AND TEACHING

## Barry Bright

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# ADULT DEVELOPMENT, LEARNING AND TEACHING.

Barry Bright

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# SECTION ONE

## Introduction

This paper considers explicit models and theories of adult development, learning and teaching and their possible interrelation. This concern, although primarily theoretical as an educational exercise, can be regarded as having practical significance in that such models and theories are regarded as having a potential impact upon the teaching of adults. Such models and theories are typically included in courses of study of and training in adult education specifically designed for practitioners in the field. The content-method relationship and its implications for theory and practice in adult education (Bright,1985) and education generally (Castell and Freeman,1978) have been discussed and the need for an integration of these suggested in outline.

In brief, the rationale and objective underlying the present paper emerge from four major considerations and postulates. These are;

1. The teaching of adults needs to be informed by considerations and perspectives of adult development. Traditionally more attention has been paid to the formulation of developmental theories in relation to children despite the early availability of some perspectives on adult development (e.g. Buhler,1953). The emphasis on child development facilitated the incorporation of some of these perspectives in the education of children (e.g. Piaget's impact on curricula and teaching). To follow the logic of the relationship between development and educational method in the teaching of children it can be argued that adult education stands in need of a similar integration between developmental theory and pedagogic practice. The recent increased attention given to theories of adult development has produced a large number of diverse theories which testify to the complexity of the subject and the difficulty of achieving such an integration. If adults possess a greater and increasing degree of heterogeneity and diversity relative to pre-adults (Baltes et al,1980: Bromley,1981), the need for the teaching of adults to be informed of developmental perspectives, which are necessarily complex, increases if it is assumed that the developmental nature of students influences the type of learning they will engage in and the type of teaching they will be exposed to. It can be argued that this need exists regardless of how adult development is defined or conceptualised. This assumes that a state of "development" can, in principle, be defined for any age period within the life span irrespective of which view of adulthood is adopted, i.e. that a state of "non-development" is impossible.

2. Conceptually and practically development and learning can be regarded as closely related if not, indeed, identical and synonomous. Because models and theories of development contain, implicitly or explicitly, a given "model" of man, such theories and models prescribe or infer an appropriate and consistent

definition of learning and vice-versa. Thus, assumptions built into models or theories in the terms in which their content is described are capable of expansion and extrapolation to include either learning or development. Within the field of child development, Piaget's theory of cognitive development (Piaget, 1983) can also be regarded as a theory of learning which influenced conceptualisation of the nature, sequencing, pace, process and content of learning. Similarly, behaviorism as a theory of learning has necessary implications for the conceptualisation of development which can be transferred to pedagogic practice (Skinner,1954). Another illustration of the conceptual equivalence of development and learning is Riegal's dialectical approach (Riegal,1979) which synthesises a theory of adult development, a theory of adult learning and a theory of adult cognition and thought. Similarly, in practical terms it may be correct to argue that if a person is learning they are also developing and that the concept of development axiomatically includes the notion of learning i.e. can a person be in a state of development without involving learning. This view is often expressed within phenomenological, existential theories which equate learning and development with experience, (e.g. Rogers,1979: Perls et al,1976). This, however, may not be correct if it is assumed that some types of development may occur in the absence of learning (e.g. pure ageing effects on development). Developmental regression phenomena are often used to challenge the formulations of some established developmental theories (e.g. Gergen,1977), however, such phenomena can be regarded, if we accept their validity for the present, as illustrating the close relationship between development and learning in a reversed direction i.e. negative development is equatable with unlearning, and suggest the possibility that development and learning are symmetrical. Often within the adult education literature (e.g. Cross,1982: Osborn et al,1982) development and learning are regarded as, and treated, independently. Although such de-coupling may be demanded by analytic convenience and clarity, within the terms of the need to establish the pedagogic implications of an adult development perspective and the assumption that learning is related to pedagogy (although independent learning indicates that this is not always the case), it is argued that there is a need to relate theories and models of development and learning. In this regard two further points are appropriate;

a) in some senses the relating of development to learning is occurring wthin the literature. The concept of life-span development is increasing in importance and with it an increase in the necessary implications it holds for adult learning (e.g. Baltes et al,1980), however, this is often more implicit than explicit.

b) the pedagogic implications of adult development and learning may be extremely complex and difficult (perhaps impossible) to establish with the same degree of clarity that has been achieved in pre-adult educational practice.

3. Given the large number and diversity of current models and theories of adult development and learning there is a need to

establish a broad structural framework within which such theories and models can be located. The traditional over-emphasis on theories relating to childhood has recently been corrected (e.g. Baltes et al,1980), but has resulted in a bewildering array of theoretical perspectives located in diverse sources of reference. If developmental theories and models are to be brought to bear upon the teaching of adults and if development is to be related to learning in this context a simplifying structure is required in terms of which differences and similarities between theories and models can be identified and their pedagogical implications assessed. Although the formulation of such an overall structure would be difficult and fraught with objections and limitations it is suggested and proposed that such a structure can be identified by interpreting theories within the terms of two general metaphysical models of development and learning which have traditionally dominated psychology. These models are sufficiently comprehensive to enable the classification of learning theories used in models of teaching, to classify different theories of adult development and to relate theories of development and learning within the context of selected models of teaching. It must be emphasised that these metaphysical models have been largely superseded by more recent perspectives (e.g. Anastasi,1958: Lerner,1978: Sameroff,1975). However, Reese and Overton(1970) regard these models as still possessing validity and usefulness as descriptive and explanatory general systems. In addition, irrespective of their status within psychology they do represent a convenient heuristic and pedagogic device for explicating the concept of development and learning and their different interpretations within the context of teaching.

4. However simplistic such a statement may appear, there is a need to recognise that all behavior and especially skilled behavior (e.g. teaching) is highly organised, largely non-random and logically sequenced and that such organisation and structuring is mediated by the acquisition, interpretation and use of knowledge and information. Different theoretical and prescriptive interpretations of behavior offer radically different descriptions and explanations and indicate that behavioral organisation and its interpretation are highly complex. Often the very implicitness of behavioral organisation obscures the complexity, causes and informational interpretive bases underlying such behavior. In essence, all behavior is commisioned for a reason: it is purposeful. Different interpretations suggest differing views of the nature of and processes by which such purpose can be attributed to behavior with consequent differences in the nature and origin of the information base which subserves it. The obvious implication for teaching in this context is that attention needs to be drawn to the complexity and organisation of teaching, the possible reasons, purposes and causes of different teaching behaviors and the importance and nature of the informational base which mediates such behavior. The present paper is only (i.e. can only be, given time and space limitations) concerned with behavioral organisation, possible purposes and informational bases relating to the perceptions teachers have of, and therefore basing their

behavior upon, adult students. As described above, the paper is concerned with theoretical and academic models and theories relating to adult development and learning which is assumed to form or is capable of forming, part of the information base underlying the organisation of teaching behavior. Thus, in one sense, it is suggested that such models and theories influence the manner in which teachers perceive and therefore teach, adult students. Of course, it is not axiomatic or necessary that theoretical knowledge will or needs to inform practical behavior (e.g. Hirst,1974: O'Conner,1973: Phenix,1964: Castell and Freeman,1978) but it is axiomatic (ideally) that a student's understanding and perspective of a subject they are studying will change as a result of that course of study. This must be so to justify the educational endeavour. The issue reduces to whether, in the context of adult education as a subject, such changes in the understanding and perspective of a subject finds expression in practical behavior i.e. teaching, either formally so or informally.

Formal, explicit academic models and theories need to be distinguished from informal, implicit models and theories which are held by some writers (e.g. Piaget 1983, Bruner et. al.1966, Neisser 1976) to exist in us all and which mediate our everyday lives and environmental interaction. Such informal mental models are regarded as summarised, categorical representations of the world and exist at a multitude of levels of generality and complexity (e.g. our mental map of the world, the country, town and house we live in) and are defined in terms of an equally large number of experiential and environmental referents (e.g. physical objects, other people, oneself, situations, feelings, memories, etc.). They form the knowledge base via which the world acquires meaning and interpretation and upon which behavioral organisation is based. Although representing reliable and stable features of an individual's environment such informal models are regarded as essentially hypothetical and tentative and are subject to modification, discrimination, elaboration and abandonment as a result of interaction with the environment. They thus form the hypotheses and predictions upon which behavior is based and the latter represent the testing of such hypotheses and predictions in the environment, i.e. behaviors represent hypotheses in action and can be regarded as the integration of theory and practice; praxis.

Although there is a distinction between formal, explicit, academic models and informal, implicit, non-academic models, in some senses they are similar if not identical. Both types of models are hypothetical, open to testing and are interpretive: they offer alternative meanings and ways of structuring and interpreting the world. In the same manner that informal models underlie everyday behavior so, ideally (but not always necessarily so) formal, theoretical models can be expected to inform practical behavior. In a sense this is one possible definition of education i.e. the description and transferring of alternative interpretive systems of knowledge (formal models). The objective of the present paper is to facilitate and

contribute to this in terms of formal models of adult development and learning. Such an eclectic approach seeks to expand the repertoire of available conceptualisations and interpretations which may assist the identification of behavioral options. As Labouvie-Vief (1980) notes, the integration of informal, pragmatic and formal, theoretical modes of thinking can be regarded as the defining characteristic of adulthood and as such is applicable to the adult teachers of adults. This paper is addressed to the latter in the hope that its formal elaboration will be integrated with the former. In this regard it must be noted that the present paper is not concerned with informal, implicit models which the teacher of adults may hold. These are oviously important but are beyond the remit of the present study.
Having described the major objectives and considerations upon which the study is based a brief description of the sections of the study will now be given.

The study will commence with a brief description of the nature and structure of formal academic theories and models following which two selected models of teaching will be analysed. This analysis will indicate the presence of sub-models and theories within those models of teaching which will be discussed in relation to how the concepts of development and learning can inform teaching. The next section will describe development and learning generally in terms of the organismic and mechanistic models existing within psychology and from which several descriptive and explanatory dimensions characteristic of each of these general models will emerge. Their relationship to age changes and age differences will be discussed in addition to establishing the close relationship between development and learning. The subsequent section of the paper will comprise a description of a variety of models and theories of adult development and learning and an attempt to classify them within the characteristic dimensions of the two general models (organismic and mechanistic) of development and learning.

## SECTION TWO

### Formal Models and Theories

A description of the nature of and relationship within and between formal academic models and theories amounts to an attempted description of the structure of formal knowledge itself. This is obviously a very complex area as many writers (e.g. Popper 1969, Kuhn 1962, Chalmers 1978) have indicated in their detailed accounts. The description offered here will, of necessity, be of a very general nature but sufficient to introduce the essential features of this system thus facilitating the broad conceptual approach to epistemology the paper is adopting and assuming.

Perhaps the main feature of formal academic models and theories is that they are methods of representing, interpreting and discovering knowledge. They are heuristic devices by which the truth about reality may be approximated and organised and by which areas of further study may be identified either by extension of or in opposition to, a given theory. By this process theories are modified, qualified, abandoned and new theories emerge as knowledge accumulates.

Another major feature of formal academic models and theories is that they are hierarchical and exist at a variety of levels from general to specific and abstract to concrete, relatively. Similarly, they are embedded within each other at the different levels. Thus, the most specific theories fall within general models i.e. general abstract models have sets of more specific and less abstract sub-models within them each of which can have descending hierarchical sets of theories increasing in level of concreteness and detail. This can be characterised as an inverted (upside-down) tree with each general model having connected offshoots in terms of sub-models and theories descending to more specific and less abstract levels (see Figure 1.).

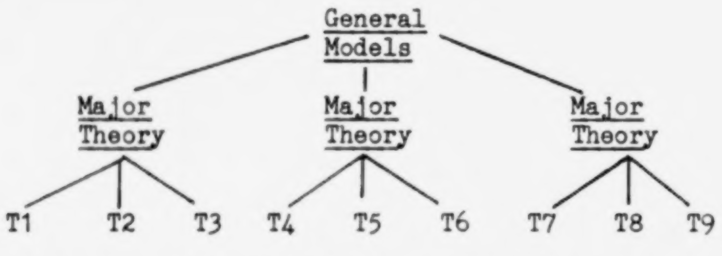

Figure 1: Schematic structure of General Models, Major Theories and Specific Theories.

Thus, History, Philosophy, the Natural Sciences and the Human Sciences can be regarded as general models within which sub-models reside (e.g. Physics, Chemistry, Biology within the Natural Sciences; Sociology, Psychology, Economics, Politics within the Human Sciences) each of which, in turn, possess a large number of theories at a variety of levels. Each general model or "forms of knowledge" (Hirst 1974) possesses distinctive logical, conceptual, validatory and methodological forms of expression and interpretation of phenomena. Thus, a philosophical view of the world is different from a mathematical view: they use different types of logic, conceptualisations and methods but they both assume that the world can be interpreted within within their different terms i.e. they are indepenedent systems based on different assumptions and methods. Within each "form of knowledge" (general model) although sub-models (e.g. Psychology, Sociology etc. within the Human Sciences) conform to the general model assumptions and methods, each elaborates and specifies its own version of that orientation and develops/possesses more detailed assumptions and methods which are different from those empoyed by other sub-models of the general model. This elaboration takes the form of more specific delineation of the phenomena under study and methodological approaches within those general ones specified by the general model. At the most detailed level such elaboration is represented by very specific theories relating to concrete and highly discrete phenomena. Within a single academic discipline there can exist several major models within which different families of theories reside. Thus, in Psychology for example, the organismic and mechanistic models were used as a way of classifying the typology of different theories. Similarly, in Sociology, the functionalist and structuralist models, and in Economics the Monetarist and Keynesian models exist and fulfil the same purpose. As Reese and Overton (1970) state;

> "Any theory presupposes a more general model according to which the theoretical concepts are formulated."
>
> (Reese and Overton, 1970, p.117.)

Having outlined the basic structural characteristics of models and theories consideration will now be given to the nature of models and theories. Essentially this comprises the use of representation and metaphor (Reese and Overton 1970, Looft 1973). In order to facilitate understanding of a phenomenon it is regarded "as if" it were similar in some respects to a phenomenon that is well understood. The use of metaphors, analogies and templates can be regarded as methods of approximating the truth about phenomena in terms of another well known and understood area or phenomenon. For example, Comte's functional theory of social systems and organisation was based on a biological metaphor i.e. the individual and group behavior of biological cells. Similarly and more recently, metaphorical references to the human brain as a "computer" are often used as a way of representing and conceptualising the structure and function of the brain. Such metaphors stimulate and offer numerous possible research areas by which the metaphor can be extended, qualified or abandoned. They are therefore heuristic (i.e. guide learning and knowledge discovery) simplifications and abstractions which attempt to comprehend and summarise complex phenomena at a variety of levels. At a very general level, for example, Philosophy is metaphorical in that it interprets the world "as if" it were a philosophical system; Mathematics interprets the world as if it were a mathematical equation; the Natural Sciences interprets the world as if it were a physical entity; Religion interprets the world as if it were spiritual etc.. At a detailed level individual discrete phenomena are also interpreted in terms of metaphors (e.g. aggression is interpreted as if it were a water overflow system (Hall and Lindzey, 1978), childhood development as if it were "programming" the child with parental directives and prohibitions (Berne, 1984), human and sub-human behavior as if it were an input-output energy ratio (Brener, 1980).

It is important to note that the accuracy or validity of the metaphor contained within models and theories is not necessarily important since it is not being asserted that the real world is as described in the metaphor, only that the real world behaves as if it were so. Similarly, because models and theories are based on metaphor it is not possible or necessary to assess them as true or false since the literal accuracy of the metaphor is not being claimed. As Gergen states;

> "All theories must be viewed as artificial templates of experienced reality. Regardless of sophistication, theories are fundamentally incapable of describing the essence of their subject matter. Concepts treat as equivalent that which is essentially distinct; they call attention to similarities among stimuli while disregarding the multifarious difference. Analytic concepts are also ill-equipped to deal with a qualitative difference among entities and with events in flux. And yet, with all their imperfections, theories are both useful and inevitable."
>
> (Gergen, 1977, p.138)

The only basis for assessment and evaluation of models and theories is usefulness (Reese and Overton, 1970). The direct empirical testing of theories is possible and desireable but the conclusion of such testing can only be in terms of utility. A theory can only be falsified (Popper,1969) never disproved since to claim otherwise would amount to rejecting a theory for the future in terms of currently available methods of testing it i.e. to foretell the future. If a theory has low explanatory or predictive power compared to other available theories its assessment can only be in terms of its utility and usefulness. Similarly, theories which are not falsified cannot be regarded as proven since future methodological developments may eventually falsify them. In this way empirical data can determine which theory or theories within a family of theories is/are the most useful and which should, therefore, be developed and tested further. Falsified theories cannot be rejected as invalid on empirical grounds, merely regarded as less useful in explanation and prediction. Models are at a more general and abstract level than the theories that fall within them and cannot be tested directly by empirical data. If several/many major theories within a family of theories within a general model are falsified the utility of the general model may be reduced as an interpretive approach. Thus, a major "paradigm" shift (Kuhn, 1962) may occur in which other models and their theories may emerge. Thus, all knowledge (models and theories) can be regarded as tentative and hypothetical.

In terms of the present paper the two major models of development which will be considered are of the most general kind and are referred to as "metaphysical" models (Reese and Overton, 1970), "world views" (Kuhn, 1962), and "world hypotheses" (Pepper, 1942). They represent "basic models of the essential characteristics of man and indeed of the nature of reality", (Reese and Overton, 1970, p. 117), and are regarded as implicit, submerged models which are capable of incorporating every phenomenon. Different "world views" are fundamentally incompatible since they interpret the world in totally different ways, have different truth criteria (i.e. different ways of defining and regarding "facts"), and they use different conceptualisations with which to describe the world. In essence they are speaking different languages and are uninterpretable between themselves. Because of this they "cannot be compared evaluatively with one another", (Reese and Overton, 1970, p. 121). Thus, the mechanistic model of development cannot be evaluated within the terms of the organismic model or vice-versa, therefore synthesis or assimilation between them is regarded as impossible. It is, however, possible to translate the terms and propositions of such a model and redefine them consistently relative to another model but this is distinguished from synthesis or assimilation in which the original terms and propositions are preserved. The latter is unalterable and suggests the educational need to give students, "...eclectic training, in which they become familiar with more than one paradigm, unlike the monotypic training that has been customary.", (Reese and Overton, 1970, p.122). The value and requirement of this type of training is that it keeps the the different models separate and does not attempt to mix them but rather specifies when different models may be used. Several examples are given by Reese and Overton to indicate this kind of "good" eclecticism. For example, Kohlberg (1968) invokes both mechanistic and organismic models in accounting for the development of different cognitive abilities i.e. the development of different abilities are accounted for by different models. Similarly, many accounts of behavior in childhood, adulthood and old age can be regarded as implicitly assuming mechanistic, organismic and mechanistic models respectively. Whilst these examples illustrate the discrete use of diferent models they also suggest the possible limitations of any one model in the explanation of human behavior across the whole life span. As Reese and Overton state;

> "At our present stage of knowledge, these kinds of eclectic theories seem to be necessary to account for the whole range of human behaviors throughout the life span."
>
> (Reese and Overton, 1970, p.123)

# SECTION THREE

## Models of Teaching

As stated in the Introduction, this section of the paper will comprise an analysis of two models of teaching from which several sub-models and their related theories will emerge. The analysis will then proceed to discuss the relevance of these models of teaching and the assumptions they contain to the concepts of developmemt and learning. Although these models are limited and are not exhaustive (i.e. there may be other models of teaching available) they adopt an orientation which is consistent with that of the present paper and will facilitate ananlysis of the relationship between teaching, development and learning.

### a)The Contingency Model

Squires's contingency model (Squires, 1982) postulates that the "how" of teachiing is determined by the nature and characteristics of the participants (who), the content (what) and the setting (where) in which teaching takes place. How one teaches depends on who one is teaching, what one is teaching and where one is teaching. It is thus a multi-dimensional model in which differences in the major independent variables will alter and affect the dependent variable i.e. teaching. Thus, it is postulated, teaching behavor will vary depending on differences in the nature and level of the subject (e.g. pure/applied; science/arts; "O" level GCE/undergraduate degree level), and differences in the physical and institutional setting where teaching takes place (e.g. illumination, warmth, acoustics, noise level, equipment, formal/informal, professional role oriented, public/private). The nature of the participants also influences teaching in that one would teach a given subject to young children differently compared to elderly adults. The model clearly indicates an interactive dynamic for teaching and regards differences within the independent variables as producing second and third order interaction effects, the combined result of which determine teaching behavior. The definition of a skilled teacher is one who can adjust to and respond to these differences in a manner which maximises students' learning by adapting their macro and micro teaching behaviors. Teaching is therefore regarded as a contingent activity, dependent on the character and value of the independent variables (who, what and where) attributed by the teacher. To the extent that teachers are aware of and respond to such differences teaching is in a cause and effect relationship with regard to the independent variables which determine it. The model is, however, more reflective and complex than this in that the teacher himself/herself is also an independent variable in that he/she is included within the participants thus indicating that the characteristics of the teacher will also affect the type of teaching behaviors engaged in. This and the fact that it is teacher's attributions (i.e. perceptions) of the parameters of the teaching situation that influences teaching behaviors, adds further support to the present paper's attempt to increase awareness of the possible value of some of those parameters.

Although this description of Squires's contingency model has been brief several major considerations can be regarded as emerging. These are;

i) teaching is a dynamic, responsive, changing activity i.e. it is not static,
ii) the independent variables upon which teaching is contingent are many and complex in their elaboration,
iii) teachers themselves are placed at the centre of the process in that it is their perceptions and awareness of the various parameters of the teaching situation (invcluding awareness of themselves) which mediate their responses in terms of teaching behavior.

Within the context of the present paper's concern with models it can be argued that the contingency model represents a general model within which more specefic sub-models reside. The contingency model draws attention to the postulated relationship between teaching and the variables upon which it depends. Although some examples of differences in variable values are given, the model is essentially general in that it can be applied to any teaching situation. All that is required is the amendment of the parameter values and their consequent interaction to yield conclusions regarding how to teach. It is obviously not as clear cut or as simple as this, but in principle this is what the model seems to imply. It is thus a general model of teaching not a specific model limited to a particular type of student, type of subject or particular form of institutional or physical setting. The metaphor contained within it is the interpretation of teaching as if it were dependent on several variables in the manner of a cause-effect relationship. Irrespective of how complex and subtle such a relationship is manifested and whether the analogy with scientic independent and dependent variables is accurate, the metaphor is clear as an interpretive device which structures and focusses upon major concepts contained within and emanating from it. Hence the emphasis upon "parameters", "values" and variables. Quantification of the latter terms may prove difficult or impossible in the context of teaching and the factors it depends upon but the metaphor leads to further elaboration of the model in these terms in order to discover the rules of inference and further detailed conceptualisations implicit in the model.

The independent variables (i.e. participants, content and setting) specified in the general model can be regarded as models in themselves at a greater level of detail and concreteness compared to the general model. The concepts of participants, content and setting are not specified in an axiomatic manner stipulating how detailed differences influence specific teaching behaviors. Thus, the variables cannot be regarded as representing detailed theories, rather they represent models since their inclusion in the general model assumes that there are such identifiable entities as participants, content and setting and that in principle differences within them can be identified and that these influence teaching. This occurs without any formal specification of those differences and the way they influence teaching, therefore leading to the conlusion that they are not theories but rather sub-models of interpretation and hypothesis by which major concepts and categories consistent with the general model are identified and whose detailed referents and values await to be detailed by more specific models and theories. The basic metaphor contained within them is the interprtetation of teaching as dependent, as if participants, content and setting existed and can be systematically differentiated and categorised. More specifically, this involves or assumes that our currently available and "well understood" general systems of categorising people, knowledge and physical and institutional settings are sufficiently similar to those believed to pertain in teaching to justify their use as a metaphor. As indicated above, whether or to what extent this is true or accurate is irrelevant to the utility of the general model and its sub-models as interpretive and metaphorical systems of tentative and hypothetical explanation. This may appear slightly obtuse since teaching obviously involves people and knowledge and takes place within specific temporal and spatial coordinates. However, if knowledge concerning any of these changes substantially then our conceptualisations about teaching may require similar alteration or abandonment if it renders previous metaphors inefficient. In this sense, it is not simply the case that teaching is contingent but that also, knowledge itself is fundamentally contingent, tentative and metaphorical. Models and theories which incorporate higher level conceptualisations and metaphors need to recognise this fact and their consequent dependence upon them irrespective of how abstract and obtuse this may appear.

As stated above, the sub-models of participants, content and setting have not been clearly identified within the contingency general model of teaching. Although all these are equally important within the context of the model and their impact on teaching it is proposed to consider further only the participant sub-model below. Consideration of the contingency model is therefore necessarily incomplete, however, time and space limitations will not permit further analyses and the characterisation of participants is wholly consistent with the orientation of the present paper.

Within Squires's (1982) contingency model some elaboration, though not formally so, of more detailed dimensions within which participants may be characterised and their impact on teaching behavior characterised, are given. Such dimensions include personality, intelligence, motivation, cognitive style, age, sex, race, occupation and social class. Quite reasonably, differences in these dimensions between individual students and groups of students are held to influence teaching behavior. Within the context of the "model" approach, however, these dimensions can and must be regarded as yet another, more specific, level of models. They each contain a metaphor in the sense that they assume the existence of the orientation of each of their dimensions which are borrowed, transferred and imposed from outside of teaching itself. Thus, they interpret participants as if there were such things as personality, intelligence, motivation etc.. Another reason for regarding these dimensions as models is that within them exist a variety of models and theories which adopt different interpretations of the dimension in question i.e. each contains more detailed, formalised and often contradictory specifications of the dimension it represents. Thus, for example, within the model of personality (i.e. the hypothesis that the term and meaning of "personality" usefully describes and denotes reliable and relatively distinct features and aspects of human behavior, attitudes and feelings) there exists a plethora of theories and models all of which could, in principle, inform teachers about the possible character and nature of their students. The same can be said for the "models" of intelligence, motivation, and cognitive style. Different and often contradictory models and theories exist within each of these models and each offers different descriptions and explanations of behavior(See Figure 2). Teacher awareness of the model labels (i.e. personality, intelligence, etc.) may alert a teacher to some of the factors he/she should consider in his/her teaching of a particular individual or group and in conceptualising himself/herself, but such considerations are not prescriptive or descriptive in a detailed or practical manner. To achieve the latter there is a need to go beyond the model labels and engage the more detailed models and theories. However, doing this may/probably will result in confusion unless the teacher makes a choice about which theory of personality, intelligence, etc. is appropriate relative to different students and groups of students. Of course, such a choice will not be possible unless a teacher is familiar with the various theories and models, again necessitating an "eclectic" approach.

The categorisation of participants into dimensions each of which can be regarded as representing a sub-model which itself can be further regarded as containing a large set of models and theories, does itself represent one level of complexity.

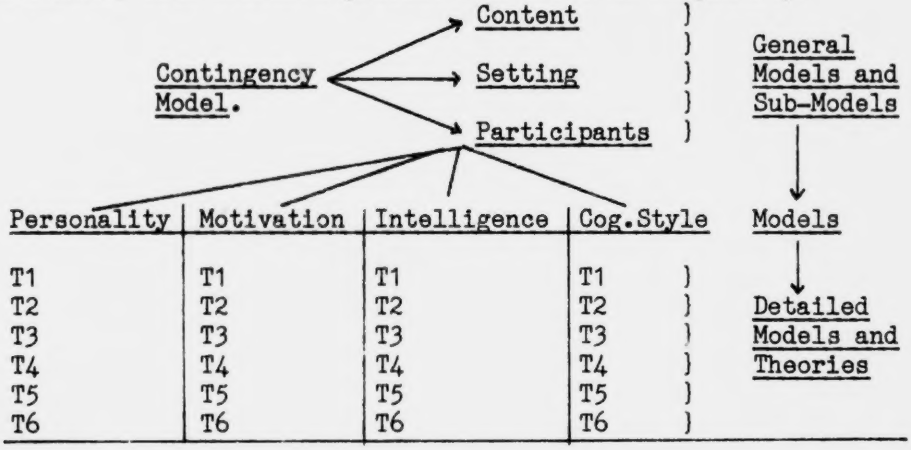

Figure 2: Contingency Model; Participant Dimensions

However, there are further levels of complexity concomitant upon this initial level. Firstly, it must be remembered that the participants in teaching refer to only one of the independent variables teaching is held to be dependent upon, and that the content and setting variables represent equally complex model and theory structures which could be elaborated in a manner similar to that suggested for the participant variable. Secondly, the content, setting and participant variables do not exist independently either theoretically or in practice i.e. they interact and are dynamic. Thus the participant dimensions for a particular student or group of students will have different forms of expression depending upon the particular constellation of factors relating to the content and the setting and will therefore have different implications for teaching. An intelligent but introvert student, for example, may learn more effectively in an institution which emphasises the formal lecture method and the strict logical sequentialing of subjects, compared to an equally intelligent but extrovert student who would function more effectively perhaps within a less formal approach to teaching generally (setting) and to subjects (content).

A third source of complexity is the fact that, having noted that the independent variables (participants, content and setting) interact dynamically, the same point may be made concerning the dimensions within the participants sub-model. Thus, intelligence and personality (Heim, 1978), intelligence and social class (Rutter and Madge, 1981), motivation and personality (Eysenck, 1947), personality and cognitive style (Child,1981, Witkin, 1976), for example, can all be regarded as interactive.

A fourth source of complexity resides in the often contradictory nature of the theories and models for each dimension of the participant independent variable. As referred to above, there are a variety of theories and models of intelligence (see Sternberg, 1985), personality (see Hall and Lindzey, 1978), motivation (see Evans, 1975), cognitive style (see Squires, 1982), for example, all of which could inform the teaching of adults. A further and fifth source of complexity in this regard is that because adult education can be regarded as a relatively new field and one that is inter-disciplinary in the knowledge it uses, the majority of detailed models and theories that reside within the participants dimensions have not been formulated, in most cases, in a manner that is relevant specifically to adults nor the education of adults. There is relatively little research available on the educational implications of the detailed theories and the majority of what is available usually concerns pre-adult learning and teaching. Thus, although in principle, teachers should be aware of a multitude of aspects, models and theories relating to each of the independent variables and their interaction, there may be a lot of doubt concerning how useful such knowledge and awareness would be in terms of its internally contradictory nature and its relative lack of detailed relevance to adult education. The former is, of course, axiomatic relative to knowledge in that "poor" knowledge may be represented by the absence of a variety of conflicting and opposing views or interpretations. As mentioned previously, Reese and Overton (1970) suggest the need for "good" eclecticism in which training comprises comprehensive coverage of distinct and seperate theoretical interpretations together with an indication of where and when different interpretations are appropriate. This assumes that different theories and models are differentially appropriate in different circumstances, however, what happens if two contradictory theories are equally appropriate in the same circumstances? Adult education would appear to be a long way from being in the position of having to consider such problems, and as Squires's contingency model illustrates (although it did not attempt to do anything but this), the most that can be achieved at the moment are broad categorisations which contain a multitude of theories and models the implications of which have not been seriously explored.

A sixth and major source of complexity emanates from acceptance of the suggestion that adults develop and that such development may or may not be a strict linear function of time. This notion is generally recognised and accepted within the literature (e.g. Baltes et.al. 1980, Neugarten 1968, Allman 1983, Gergen 1977, Kohlberg 1973, Perry 1970, Riegal 1979), and within the present analysis of teaching considerably complicates the theoretical and practical issues and leads to the conclusion that development, learning and teaching are all interrelated.

Within the participant dimension "models" (i.e. personality, intelligence, motivation etc.) the detailed models and theories which reside there often contain an implicit assumption that the phenomena they are describing are static in terms of the descriptions used. Even theories of development are often restricted or limited in their descriptions of development to pre-adult periods of time (e.g. Piaget, Freud, Thurstone). Other theories often do not attempt to incorporate a developmental perspective and assume the traditional psychometric quantification of phenomena "frozen" in time (e.g. Riegal 1979, Shotter 1975, Heather 1976). Given the general static descriptive orientation that the detailed models and theories within each of the participant dimensions may be regarded as possessing and the fact that these interact between each other and with the equally complex factors of setting and content, the cognitive complexity of teacher assessments of these and the way they influence teaching would appear to be extreme and counter-productive. If a developmental perspective is added which itself is complex (i.e. it is not simply a function of time, or there are several different functions of time), all of the participant dimensional models, the more specific models and theories within them and their interaction effects with each other and the other independent variables of setting and content, can be held to change as a function of development. In addition, because development as a concept can be regarded as a model itself in that it contains a variety of more specific and contradictory models and theories within it, the level of complexity is increased by a further order of magnitude. The addition of a single interpretation, theory, model of development to earlier considerations would create complexity of a high order. However, there are many theories and models of development and if "good eclecticism" is to be sought, each of these different interpretations and perspectives should be considered together with their different implications for the participant categories in terms of which students and teachers can be described. In other words, models of development describe changes within each of the participant dimensions differently across time. Not all models and theories of development apply to all participant dimensions, however, the point remains. A developmental perspective expands the descriptive and explanatory categories of participant dimensions across time and further increases the complexity of the participant independent variable (see Figure 3.).

In addition to the above sources of complexity, Squires's contingency model also specifies that the scale and focus ofteachers' considerations and assessments of these dimensions should ideally operate at two levels i.e. individually - students and teachers, and groups - students and teachers. Thus, in principle at least, teachers who are responsibly and explicitly relating the manner of their teaching to the characteristics of their students and themselves should make individual and group assessments of their students and themselves in terms of a multitude of interpretive and often conflicting set of

| Participant Dimensions | Independent Variables | Level | Development (Model) ↓ Detailed Theories. ↓ |
|---|---|---|---|
| Intelligence (T1,T2,T3,etc.) | Content | Individual | |
| | | Group | |
| | Setting | Individual | |
| | | Group | |
| Motivation (T1,T2,T3,etc.) | Content | Individual | |
| | | Group | |
| | Setting | Individual | |
| | | Group | |
| Personality (T1,T2,T3,etc.) | Content | Individual | |
| | | Group | |
| | Setting | Individual | |
| | | Group | |
| Cognitive Style (T1,T2,T3,etc.) | Content | Individual | |
| | | Group | |
| | Setting | Individual | |
| | | Group | |

Figure 3: Interaction Matrix; Independent variables(Participants, Content, Setting) X individual and group levels X developmental models and theories.

theoretical systems describing major model perspectives anddimensions.

It is not being suggested that it will ever be possible or desireable to achieve such an explicit and formal delineation of the complex factors held to influence teaching. The analysis has merely adopted a formal and theoretical perspective within which the contingency model has been elaborated and itemised in detail. The contingency model is a rich source of perspectives within which the complexity of teaching and the relationship between theoretical knowledge and practice may be viewed. Although the complexity of teaching has been demonstrated in a theoretical sense, if the contingency model is accepted as a useful and possibly accurate description of the actual process and practice of teaching, then something similar to the complex processes described above may be occurring at an implicit, informal level. As Squires (1982) notes, the very implicitness and spontaneity of behaviors and processes is an indication of skilled behavior. Thus, to the extent that teachers are responding implicitly to factors that influence teaching in a manner analogous to the above analysis, they are demonstrating skilled behavior. Of course, this raises the fundamental question concerning whether teachers are responding in a flexible manner and if so, on what basis does this occur? Squires (personal communication) suggests that on the basis of informal micro-analyses of teaching behaviors and self-report procedures, teachers are responding in a flexible manner relatively to lower level contingencies (e.g. opinions, questions and reactions of students). It can also be argued that skilled teaching behavior exists but is not defined in terms of the above analysis, which was seen to be explicitly complex and which represents an unrealistic degree of cognitive overload if attempted in a formal, conscious manner. In these terms, skilled teaching behavior may be represented as intuitive, heuristic strategies which summarise or collapse the above complexity into shorthand rules and prescriptions. This possibility is outside the remit of the present paper but does not render it (i.e. the present paper) irrelevant since formal knowledge doesn't necessarily replace informal knowledge and is often used in a practical field, as a means of structuring and organising both in relation to behavior.

One objective of the present paper is to demonstrate the relationship between development and learning and the relationship of these to teaching. The former relationship will be considsered in more detail in the following section, however, both relationships can be considered at this point. Quite simply, if teaching involves facilitating and/or directing students' learning and if teaching is partly dependent upon the nature and characteristics of the participants involved in teaching, a major component of which is the way such characteristics develop, then development is related to learning and both are related to teaching. Consideration of the characteristics and major dimensions within which participants may be described is meaningless, it is suggested, without a developmental perspective. Whilst stability and continuity in some dimensions are reported by some researchers (e.g. Livson 1973(personality), Schaie 1975(intelligence)), many other dimensions and sources of variability in development are more frequently reported (Baltes et al.1980). Adulthood spans a period of approximately 40-60 years (depending upon which definition of adulthood is adopted) within which a variety of major life events occur in addition to an interaction with whatever biological and other effects ageing confers. It is suggested therefore, that it is inconceivable that development does not occur within and during adulthood. If this is accepted, the necesssity for adopting a development perspective in the teaching of adults is axiomatic within the contingency model. Subsequent sections of this paper will offer alternative definitions, descriptions and explanations of what development may comprise as an approach towards informing teaching concerning the posssible nature of its participants.

## b) The Non-Contingency Model

In contrast to the contingency model, the non-contingency model (Squires 1982) postulates that teaching, irrespective of who is being taught or doing the teaching, what the content of the teaching comprises or where such teaching takes place, should and must adhere to fundamental principles or laws relating to the nature of learning itself. Thus teaching does not depend on the participants, content or setting and is not regarded as a multi-dimensional integrative activity in the sense of the contingency model. In the non-contingency model learning is very clearly and more explicitly related to teaching in that the practice of teaching is held to be necessarily informed by conceptualisations of and conclusions concerning the processes of learning. The model refers to four schools of thought concerning the nature and processes of learning and extracts the fundamental principles upon which teaching should be based. The schools of thought referred to are the Behavioristic, Cognitive, Information Processing and Humanistic approaches. Although reference is made to the decline in recent years of the general theory approach, the obvious implication underlying the model is that all forms of teaching should incorporate all or some of these principles in order to achieve efficient learning.

In terms of the previous analysis of the contingency model within the perspective of academic models and theories and levels within these, it can be argued that the non-contingency model represents a general model within which other models and theories reside. As a metaphor the non-contingency model is using the non-dependence of teaching upon those factors identified within the contingency model and substitutes general fundamental principles in a non-contingent and imperative manner.

The four schools of thought from which these general principles are drawn can be regarded as sub-models in that each represents a distinctive interpretation relative to the others and each

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contains a variety of more detailed models and theories many of which are contradictory. Each of the four schools (sub-models) contain a basic metaphor. The Behaviorist metaphor resides in the assumption that all matter (e.g. physical objects including people) react passively to the operation of physical laws and that all observeable change is the result of external conditions obeying these physical laws which cause changes in a systematic and potentially identifiable cause and effect manner. Thus, learning is reduced to the operation of physical laws and changes in behavior are attributed to external environmental contingencies and conditions. Within this approach, although there are some exceptions (e.g. Latent Learning (Tolman and Honzig 1943); Observational Learning (Bandura and Walters 1969)) learning is contingent upon reinforcement but the latter is axiomatic and non-contingent for learning to take place. As will be described in a later section this approach is compatible with the mechanistic metaphysical model.

The cognitive metaphor involves the assumption that expalanations of activity, changes and behavior must focus on internal states and processes. The essential metaphor is that of an organism which changes and engages in activity spontaneously therefore, learning must be interpreted relative to such hypothesised internal states and processes. Cognitive theories of learning postulate inherent activity within an environmental context mediated by internal mental structures and as such, as will be demonstrated further below, can be regarded as conforming to the organismic metaphysical model. Within this approach emphasis is placed upon such concepts as goal, purpose, structure, intention, plans, subjective meaning and interpretation in terms of understanding and describing the learning process.

The Information Processing approach, whilst accepting the importance of internal processes, incorporates a machine metaphor in its interpretation and equates the human brain as analogous to a computer which comprises a highly complex set of processes by which information is analysed and acquired. Thus, emphasis is placed on input recognition, signal-noise detection, neural codes, sensory codes, storage capacity, "bits" of information, retrieval, trace decay etc. in terms of which learning must be conceptualised. It can be argued that this approach is organismic in that emphasis is placed upon internal processes and structures (e.g. Lindsay and Norman 1972), however, the mechanistic metaphor is clear and the analysis is molecular although there is refernce to wholistic contexts.

The Humanistic school adopts an essentially organismic and internal metaphor in which the role of subjective experience in expressing and discovering potential in the individual is emphasised. Within this approach learning is a universal yet individual phenomenon defined in an informal and subjective manner.

It is suggested, although many objections could be made against this proposal, that the four approaches to learning within the non-contingency model can be re-classified within the terms of two broader models. This involves regarding the Behavioristic and Information Processing approaches as conforming to a mechanistic metaphor and model, and regarding the Cognitive and Humanistic approaches as conforming to an organismic metaphor and model (see Figure 4.).

| Theories of Learning | | Metaphysical Model |
|---|---|---|
| Behavioristic | ]----------> | Mechanistic |
| Information Processing | ]----------> | Model |
| | | |
| Cognitive | ]----------> | Organismic |
| Humanistic | ]----------> | Model |

Figure 4: Re-classification of non-contingency model theories of learning into Organismic and Mechanistic models.

Such a re-classification of learning theories enables the relating of development to learning in a fundamental sense, since, as will be described in a later section, the two major models of development traditionally discussed are the organismic and mechanistic. This merely confirms the earlier observation that the broadest models (i.e. metaphysical) are capable of explaining, theoretically at least, all phenomena which, in the present context, includes both development and learning i.e. they are models of development and learning.In addition, this also enables the relating of teaching to learning and development since the importance of a developmental perspective and dimension to teaching was emphasised in the discussion of the contingency model (i.e. the participant independent variable), and the importance of learning was seen to be central to the non-contingency model (see Figure 5.).

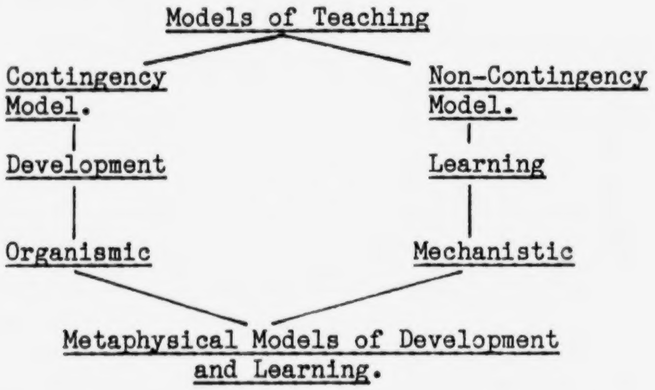

Figure 5: Models of Teaching, Development and Learning relative to Organismic and Mechanistic Models.

What this amounts to saying is that the contingent and non-contingent models of teaching each comprise elements of both organismic and mechanistic models of learning and development and thus demonstrates the relationship between teaching, learning and development.

### c) The Contingent and Non-Contingent Models of Teaching.

It can be argued that both the contingent and non-contingent models are contradictory in two senses i.e. they contradict each other and contradict themselves. In terms of the latter, the contingency model formulates a fundamental general principle (i.e. it all depends) which specifies the absence of fundamental principles and is equivalent, in a metaphorical sense, to stating that "the truth is there is no truth". This may be a relatively superficial observation in that in this instance the general principle being referred to is specifying an open and uncertain approach, however, it does suggest, in one sense at least, that the contingency model can be regarded as a non-contingent model. Equally, but possibly more seriously, the non-contingent model can be regarded as a contingent model or a group of contingent models. The rationale underlying this suggestion is that teaching is held to depend on adherence to the general principles identified as existing within the four models/schools of learning theory. The independent variables of the contingency model (participants, setting and content) have been substituted for general learning principles within the non-contingency model. In essence, both models of teaching regard effective teaching as a dependent variable but disagree concerning the nature of the independent variables upon which it is dependent and which cause and facilitate it. In this sense the non-contingency model is postulating that effective teaching depends upon the structuring and design of teaching which incorporates and reflect general principles of learning.

Equally, and again more seriously for the non-contingency model, both models of teaching would appear to refer to the nature of independent variables and their impact on teaching in terms of measureable amounts and quantities. Thus, within the non-contingency model, the extent or degree of activity, practice, meaning, reinforcement, structure and redundancy, for example, can be more or less in both relative and absolute senses. The impact of such variations in independent variable values upon effective teaching can therefore be regarded as dependent in a cause and effect manner. This can be regarded as weakening the concept of fundamental principles and indicates the contingency relationship present within the non-contingent model.

There is another possible source of internal contradiction within the non-contingent model of teaching. As indicated above, this model incorporates four different models of learning which can be re-classified into two broader models (organismic and mechanistic). These are regarded as general, metaphysical models (Reese and Overton, 1970) which are theoretically incompatible. To present them as separate, discrete and alternative models of interpretation which can inform teaching in a selective manner, is consistent with Reese and Overton's demand for "good eclecticism" i.e. unmixed models. However, the non-contingency model seems to imply that all of the principles from each of the

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four schools (two general models) have a cumulative bearing on teaching. This, however, is theoretically impossible since metaphysical models represent fundamentally different views of the world and are both capable, within their terms, of explaining all phenomena and are therefore, both equally applicable to every teaching situation in opposition to each other.

It can, of course, be argued that the above is a purely theoretical analysis and illustrates, once again, the gap between theory and practice. As Squires notes there is a sense in which all of the principles enumerated within the non-contingency model make intuitive sense to practitioners and all do find a place in everyday teaching in which they are adapted and modified to suit particular circumstances. In this respect, Squires refers to another sense in which the fundamental principles of the non-contingent model are contingent i.e. that their differential application to specific circumstances depends on the suitability of those situations (in the opinion of the teacher) for their application.

Although an obvious cause of criticism, the above theoretical analysis is instructive in terms of illustrating some aspects of the nature of knowledge used in teaching and their implications for the practice of teaching and theory and model formulation. The incorporation of the organismic and mechanistic models within the non-contingency model is strictly and theoretically speaking, not permissible and leads to epistemological confusion and contradiction. The fact that the mixture of principles derived from both these models has intuitive appeal in a practical sense suggests the need for a new model which translates both sets of principles into a new set informed by different comprehensive conceptualisations. Baltes et al 1980 call for such a meta-theoretical reformulation. Lerner (1976), in the context of the nurture-nature debate (mechanistic and organismic models respectively), and following Anastasi(1958), suggests the notion of dynamic interactionsim of both sets of variables within which intelligence, biological maturation and baby battering (Sameroff,1975), for example, may be interpreted.

As stated above, the second contradiction concerning the contingent and non-contingent models is that existing between them i.e. it all depends vs it doesn't depend. Earlier analysis suggested that both models are essentially contingent but differ in the factors they stipulate teaching depends upon. In these terms, and ignoring for the moment the between metaphysical model issues inherant in the non-contingency model, an integrative approach is possible. If the contingent and non-contingent models of teaching can both be regarded as contingent models (i.e. the essential nature of teaching is contingent) they can be regarded as two different theories within the general contingency model of teaching. Thus, the difference between them is a within model issue rather than a between model issue and is theoretically capable of resolution and synthesis (Reese and Overton, 1970; Looft, 1973).

The integration of these two theories of teaching resolves into the proposition that the general principles of learning (e.g. feedback, reinforcement, meaning, structure etc.) differ in type, form, intensity, frequency, level and process depending upon the teacher's assessment of individual and group parameters. Thus, a student who in the opinion of the teacher was shy, introvert, lacking in confidence and of low academic ability would receive reinforcement, feedback etc. in a different manner to that received by a student who was considered to be confident, assertive, extrovert and very intelligent. One student may require frequent supervision and verbal reinforcement from the teacher perceived (by the student) as a status figure whilst another student may be reinforced by discovering the conceptual links between their current knowledge and new knowledge relatively independently. In both, reinforcement and cognitive structure notions are involved but take different forms, intensities, frequencies and processes depending upon the teacher and the student involved. Generally, therefore, the teacher's perceptions of the participants characteristics (e.g. personality,intelligence, motivation, cognitive style etc.) mediate the manner in which the general principles of learning find their expression in practice. Similar considerations apply to the content and setting factors within the contingent model both of which interact with and influence the specific application of general learning principles. This, of course, adds further to the theoretical complexity of teaching.

In terms of the relationship between learning and development and their relationship to teaching it could be argued that the contingent and non-contingent approaches to teaching conceptually de-coupled development and learning respectively and that within these narrower approaches both organismic and mechanistic views co-existed (the non-contingency model is the best example of this). From the metaphysical model point of view this contradicts both the comprhensiveness of these models (i.e. they can explain/interpret both development and learning) and the need to avoid mixing them within the same approach. By regarding both models of teaching as essentially contingent in nature the link between development and learning has been re-established and their relationship to teaching demonstrated. However, the problem of mixed metaphysical models still exists within these two "theories" of teaching.

# SECTION FOUR

## Mechanistic and Organismic Models of Development and Learning

As stated previously above, Reese and Overton (1970) regard the organismic and mechanistic models as metaphysical models i.e. their scale of interpretation is sufficient to explain every phenomenon. They represent fundamentally different and essentially philosopical views and interpretations of the world and the nature of reality (hence the term "metaphysical") within which more specific models and theories reside. As Reese and Overton state;

> "...it is more important to recognise that the establishment of the most circumscribed and concrete models is dependent upon the availability of more general models, and these upon more general models yet, in an ever widening series terminated only by the most general and hence most basic models - metaphysical models. It is in this sense that we are not today, nor can we ever expect to be, free of basic philosophical presuppositions."
>
> (Reese and Overton, 1970, p.130)

Given this and the essentially philosophical nature of these models it is necessary to examine their basic views of the nature of reality in order to elaborate them into models of development and learning.

### a) The Mechanistic Model:

The mechanistic model adopts as its basic metaphor and focus of conceptualisation the machine, in terms of which the universe is regarded and interpreted. All forms of matter are considered to be composed of and reduceable to elementary and molecular particles which are passively reactive in obeying natural, physical laws and principles of lawful interaction in a chain-like cause and effect sequence of events. All matter, events and phenomena are reduceable to the operation of such laws and elements, from the universe itself which is the sum of all these lawful actions, to the smallest microbe or sub-atomic particle. Thus, differential aggregations of matter are all reduceable and equivalent to elementary particles and the laws governing their interaction i.e. the whole is the sum of its parts. The universe and everything in it is regarded as reacting lawfully to external forces exerted upon them. All matter is seen as inherently at rest and change, movement and activity are represented as the lawful reaction to external forces arising from the lawful reaction of other parts of the system. Change and activity in one part of the system therefore represent external forces impinging upon other contingent parts of the system. Such forces and lawful processes are the only efficient cause and explanation of activity and events. Given the existence of such physical laws governing the reactive behavior of elements, total prediction of future and explanations of past activity and events is therefore possible. All that is required is accurate description of the current state of the system elements and the laws concerning them in order to establish the cause and effect sequences of reactive events either retrospectively or prospectively. Because fundamental physical elements and lawful processes are invariant i.e. they do not change, and because all phenomena can be interpreted in these terms, all phenomena are, in principle, quantifiable and therefore predictable. The overall picture emerging from this perspective is that of a physical, passive, quantifiable and predictable universe comprising of basic elementary particles which react lawfully to imposed external forces. Consistent with this view, and a necessary corollary of it, is the assumption of naive or scientific realism in which it is postulated that there is a real physical world and that information concerning the world conveyed by the physical senses is an accurate representation of it. This is often referred to as the "copy theory" or "mechanical mirror" (Langer,1969) view of perception and knowledge. Knowledge about the world is therefore regarded as objective and independent of the knower.

It is relatively easy to understand how such an approach in its application to psychology and human behavior has generated the reactive, passive, robot or "empty organism" model of man. The human individual is regarded, like all matter, as comprising elementary particles and processes which are invariant and which are essentially passive but react lawfully to external forces. All mental phenomenon (e.g. learning, thinking, perception, volition, memory) are reduced to such physical elements and processes, and the explanation of behavior is sought in terms of external forces or events impinging upon the individual. One of the best illustrations of this approach are the classical (Pavlov,1927) and operant (Skinner,1938; Watson and Rayner,1920; Thorndike,1911) conditioning theories of learning which adopt an elementaristic interpretation of environmental events. Thus, environmental forces impinging upon the individual are sensory events referred to as stimuli which can be described and identified in a discrete and detailed manner. These events and their lawful relationship to responses are associated in a molecular and discrete form via the process of reinforcement which is regarded as a basic law and process by which environmental events and forces determine behavior. All explanations of behavior are reduceable to these basic processes which are seen as physical cause and effect laws. If the occurrence or nature of environmental stimuli change or alter, behavior will change in an appropriate, predictable and quantifiable manner. To support the behavioristic claim that the laws of learning and processes of reinforcement and environmental programming are universal such laws and processes are held to exist for all species including homo-sapiens. All species are held to learn according to the same laws which have evolved and serve an adaptive and survival function i.e. adaptation to the environment and changes in the nature and timing of its contingencies. However, the acquisition and operation of the laws of learning in all species is essentially passive and reactive. Because all behaviors are reduceable to the same basic laws they are regarded as not possessing qualitative differences. Different behaviors represent and are explained by differences in external stimuli which cause those behaviors and are produced by the same laws of learning and environmental determination. Qualitative differences in the laws of learning and their basic elements (stimuli and responses) are not possible, they remain invariant fundamentally, therefore,behavior mediated by such laws and elements cannot exhibit qualitative differences. Quantitatively, differences in behaviors can be assessed and described (e.g. topography, duration, type, etc.) and the external eliciting stimuli identified. Identical behaviors are always attributed to the presence of identical external stimuli and qualitative differences between identical behaviors is regarded as impossible.

It may be apparent that the mechanistic model as briefly described above is easily elaborated into descriptions of learning but may not be as easily translated into developmental terms. As Reese and Overton note;

> "...theories of development (within the mechanistic model) have generally been refinements or extensions of more general behavioristic theories."
> (Reese and Overton, 1970, p.126)

This is based on the fact that, in one sense, the term "development" is a misnomer within the mechanistic model. All behaviors and events are reduceable to basic invariant cause and effect laws and elements, therefore, the only difference between a learning perspective and a developmental one is the time span considered i.e. seconds, minutes, days vs weeks, months, years (quantitative differences). Development can therefore be regarded as the cumulative addition of reactive responses to external stimuli and forces, a definition which makes the distinction between learning and development arbitrary.

Similarly, if development within the mechanistic model can be regarded as equivalent to a chronicle of external forces and stimuli and the resonses they elicit, there is no necessary relation between those external forces and stimuli and age or time. The explanation of behavior changes is sought in terms of changes in the nature of environmental stimuli which, although they take place in time, are not necessarily related to it. Within this perspective therefore, time and age themselves cause nothing and are not related to changes in behavior. A conceptualisation of development which does not invoke a more direct role for time or age may appear unusual and dubious. However, if development is defined in terms of behavioral change, as it is in the mechanistic model, the above logic would appear consistent and unavoidable. The dubiousness of the mechanistic model's view of development may illustrate the possibly greater pervasiveness and generally understood and accepted approach to development of the organismic model.

Another implication of this interpretation of development is that, unlike the organismic model's view, development is totally open and is not prescribed within pre-determined levels, forms, stages, sequential orders, etc.. Within the range of potential human behaviors conferred by phylogenesis, any human behavior can follow or precede any other. The sequencing of behavior over any period of time is determined by the nature and type of external stimuli and the responses they elicit in accordance with the laws of learning. There are no pre-determined end states or hierarchical stages of qualitatively different behaviors which unfold in a fixed sequence. In this sense, the mechanistic model is non-teleological i.e. it doesn't have a fixed end point in terms of the types of behaviors achieved, therefore, development can be regarded as a continuous uninterrupted phenomenon. The basic laws of learning and reinforcement and the environmental programming of behavior they are held to result in, are continuous from birth to death. Some researchers suggest that these laws even operate before birth i.e. the unborn fetus can be classically conditioned (e.g. Spelt,1948). Thus, development is regarded as a continuous chronicle of lawful reactive responses to impinging external stimuli. Mentalistic concepts such as will, purpose, intention, consciousness etc. are regarded as derived causes and are reduceable to the efficient causes specified in the basic laws of learning and reinforcement.

In this respect, within the mechanistic model, "development" as a term is purely descriptive not explanatory. It is regarded as a relatively meaningless label which indicates the passage of time and the possible existence of a history of environmental stimuli and responses, the details of which remain to be explained in terms of the basic mechanistic laws. Within this interpretation, development requires explanation by reduction to such basic laws. This is contrasted with the view of the organismic model in which development is an "a priori" explanatory concept i.e. the term development denotes substantive and irreducible processes which are essential in explanations of human behavior and development.

### b) The Orgamismic Model:

The organismic model adopts as its basic metaphor the active organism which is regarded as essentially active and changing, the source of which comes spontaneously from within itself. Thus, all organisms are inherently active and are engaged in continuous, structured transition (Cassirer, 1951). One example of this transition process is the egg - caterpillar - cocoon - butterfly developmental sequence in biology. This model accepts the necessary existence of elements and parts which comprise whole organisms but interprets them as deriving their meaning, function and the structural relations between them from the meaning and function of the organism as a whole. Thus, the elements and parts exist within an organised system and their meaning and operation can only be properly understood within the context of that whole system. Given that whole systems are necessarly engaged in continuous transition and change, the elements and parts of such systems are also in transition which continuously redefines their form, meaning and function, and the relationships between them and to the organism as a whole. Organisms cannot, therefore, be reduced to basic elements and laws because the elements and rules governing their form, function and interaction change in accordance with with the transitional changing of the whole. Thus, the mechanistic model's assumption of fixed and stable identies of basic elements and laws does not apply therefore prohibiting the use of reductionistic explanations. Discovering the sequence and rules of transition governing the whole organism and the elements and parts which comprise it and their altered relationships to each other and to the organism as a whole becomes the investigative and epistemological concern. Organismic transition and changes are not reducible to the mechanistic explanation of external forces but are rather regarded as emerging from within organisms themselves via evolutionary and genetic processes. The environment may exert an influence in facilitating or inhibiting such transition and is therefore regarded as a necessary but not sufficient condition. Such transitions and changes are characterised as residing within, "... the essential nature of a form..."(Reese and Overton, 1970, p.133). Each formal stage or transition organisms progress through contain the basis for the subsequent stage or transition and so on in a fixed, sequential manner. Thus, the nature of cause within the organismic model is seen as formal i.e. residing in internal form, rather than the mechanistic model's assertion of efficient external cause represented by basic laws and elements. The existence and nature of internal form is therefore essential and axiomatic within the organismic model. In this sense form and changes in form can be identified at the whole organismic level (e.g. egg - caterpilar - cocoon - butterfly) and within the organism in terms of structural transitions in the elements and parts. The notion of formal cause and progressive development clearly involve a teleological interpretation in which successive stages and forms of and within organisms unfold in a fixed manner towards an end state or goal. Such an interpretation necessarily infers qualitative differences between different transitions and the structural forms which represent and subserve them, and contrasts with the reduction of qualitative difference to quantitative explanations within the mechanistic model.

In its application to psychology the organismic model has resulted in the active organism or "organic lamp" (Langer, 1969) model of man in which actions and behaviors are regarded as emanating from within rather than being elicited by external forces and stimuli. Human behavior is interpreted as being based on and mediated by internal biological and psychological structures and forms which possess wholistic organisation. Such organisation of internal structural forms provide the meaning, function and relations and definitional context for those formal elements. Thus, the structure and function of internal forms, their organisation, inter-relations and the rules of their transition become the main focus of enquiry. The category of internal forms and psychological structure and function become primary considerations in the explanation of human behavior, and transitions in the structure and function of such forms become the major and necessary explanatory concepts for behavioral differences and development. Because such internal forms and structures are qualitatively different and are not reduceable to either basic laws and elements (mechanistic model) or earlier forms and structures, the behaviors they mediate are also regarded as qualitatively different. Identical behaviors (e.g. talking in adults and children) are regarded as qualitatively different because they are held to be subserved by qualitatively different forms, structures and functions which necessitate different meanings, contexts and functions for such behaviors. Such an interpretation, it will be remembered, is impossible within the mechanistic model. Each formal transition involves not just restructuring the relationship between existing elements and parts but is also held to involve changes to the parts and elements and their functional relationship to the whole organised system. At each stage of such transitions, new properties emerge which are not reduceable to earlier forms and structures since those are held not to exist and are the product of the organised interaction of the new forms and structures in combination. For example, sight is a property of the visual system as a whole and is not attributable to any individual component of the system. The development of the fetus from conception to birth can be regarded as a progressive and increasingly differentiated transition of physical forms and structures by which the essential and necessary organs and elements consistent with the form, function and structure of the fetus as a whole are established. These, in combination, yield essential properties (e.g. movement, respiration, sight, audition, sucking). Although this is a physical example, essentially the same processes are held to apply to psychological forms, structures and functions in development.

Given that the organismic model locates the dynamic for change internally it is not surprising to find that the model's account of human knowledge also emphasises an internal, formal orientation. Whilst not denying the possibility of a real physical and material external world, the model holds that knowledge of the world is a function of the interaction between internal structural forms and the nature of things in themselves. As those structural forms(i.e. internal) change, our knowledge of the world also changes in a qualitative sense. Thus, internal psychological structures and functions mediate between the real world and the human organism and influences interpretation of the world in a participative manner. This is one reason why the organismic model is sometimes referred to as the "organic lamp" model i.e. the individual illuminates the world and makes it understandable and meaningful in terms of his/her interpretations of it. Such interpretations are mediated by internal forms, structures and organisation.

The organismic model corresponds more closely with what is traditionally regarded as development i.e. sequential unfolding of qualitatively different levels of operation and functioning. One reason for this is that, for the organismic modle the term "development" is an explanatory concept not just a descriptive one as in the mechanistic model. Thus, the term denotes characteristic processes and concepts which are irreducable phenomena and which are themselves explanations. The organismic model therefore defines and regards the concept of development in a direct and meaningful sense rather than the derived and symbolic sense of the mechanistic model. For the organismic model, development is before the fact (i.e. it defines and explains facts) but for the mechanistic model, development is after the fact (i.e. development is explained by reduction to elementary and basic facts defined in other terms).

The emphasis upon organised wholistic systems and their interacting parts within the organismic model prohibit the assessment of behavior in terms of material identity or similarity. Instead, emphasis is placed upon assessing the function of behavior and the structures that underly them in the context of the goals and functions of the organism within a developmental framework. Organisms are regarded as possessing defineable functions which are mediated by internal structures and forms which become the object of investigation. The structure-function relation is of central concern in that the nature of different defined functions within development are assumed to imply and necessiate subservient and mediating internal structures and psychological forms. For example, Piaget defines the overall function of intelligence as biological adaptation and suggests the existence of schemata and logical operations as internal structures which serve this function. More specifically, progressive and sequential age-related changes in these internal structures and forms are postulated which subserve the adaptive function at each stage of development. The structure-function notion also permits a distinction between process and behavior in that, as already mentioned, different structural processes may result in identical material behaviors. Structural differences underlying the same behaviors indicate that such behavior are qualitatively different. The attribution of goal or purpose to the organism (i.e. teleological) is self evident in the assumption and definition of function.

In terms of what it is that changes in development, the answer for the organismic model is clearly in terms of structures, forms and functions. As Reese and Overton state;

> "Within the active organism model, development refers to changes in the form, structure or organisation of a system...."
>
> (Reese and Overton, 1970, p.139)

The direction of such changes is regarded as end states or goals which act as, ".... a principle for ordering change.."(Reese and Overton, 1970,p.139). Thus, postulated end states or goals define functions which are held to be necessarily related to structures and forms of organisation. This raises the teleological aspect of the organismic model in terms of which two points may be made. Firstly, the hypothetical and interpretive nature of models permits the organismic model to regard organisms as if they had developmental end points. Reference to biological and physical examples of development which are interpreted as illustrating such end points demonstrates the use of metaphor in the application of this model to psychological development. Evidence from examples of the latter, from some theoretical perspectives, are held to demonstrate the validity and utility of this metaphor. Secondly, given teleological end points or states, different definitions and criteria of such end points (i.e. maturity) are implied by different psychological modes of development (e.g. cognitive, ethical, social, perceptual, logical etc.) and different points in the life-span at which developmental progression reaches its hypothetical end state are also implied (e.g. early infancy, late childhood, adolescence, early adulthood, late adulthood, old age, death). For example, Piaget's theory of cognitive development specifies the end of development occurring in late adolescence, wheras, Erikson's theory of psycho-social development extends from birth to death. However prescribed by individual theorists, the organismic model clearly accepts change and development as given and also specifies the direction of that change.

Another aspect of development that the teleological assumption of the organismic model involves is that of a "closed" system (Riegel, 1979). Developmental progressions can only proceed in a given direction, the stages of which follow on from each other in a fixed, invariant and irreversible manner. Within this framework, the only developmental question of interest is the degree/extent of progress along the prescribed developmental path individuals achieve. As will be discussed below, specific theories of development within the organismic model are usually "mode" specific and taken together represent a collection of different types of development (e.g. cognitive, ethical, social, logical, perceptual), that individuals are held to progress through simultaneously or at different time periods and rates. However, within any one of such theories the developmental options are limited to the stages in the ordered sequence specified. There are, however, important differences between theories in these terms which will be discussed at the end of this section.

A final concept of the organismic model is that it regards development as inherently discontinuous. This is mainly based on the notion that changes in structural forms and comcomitant changes in the elements and their relationships, yields a new level of formal organisation which is not reduceable to earlier forms of organisation and which also result in new or novel emergent properties. The latter cannot be analysed in terms of simpler components since none of them possesses the new property individually, it is a product of the new organisational form and structure. Thus, development is characterised as progressing in terms of qualitatively different levels of organisation and properties in the manner of successively rising plateaus. For example, children at different stages of Piaget's theory of cognitive development are regarded as experiencing the world in qualitatively different ways. Perry (1970), writing of intellectual and ethical development in college students notes; "... an evolution in students' interpretation of their lives evident in their accounts of experience...", and goes on to state that;

> "The evolution consists of a progression in certain forms in which the students construe their experience..These "forms" characterise the structures which the students explicitly or implicitly impute to the world, especially those structures in which they construe the nature and origins of knowledge and of responsibility."
>
> (Perry, 1970, p.1)

Thus, in addition to referring to forms and structures, Perry also clearly identifies the progressive evolution of these which he categorises into a hierarchical system of qualitatively different and superior levels.

As an approach to learning the organismic model is not as easily translatable as the mechanistic model because of the changing and complex nature of the formal elements which mediate it. However, it is relatively easy to see the link between the organismic model and cognitive approaches to learning. Within the latter emphasis is placed upon the existence of organised formal structures in terms of which new knowledge acquisition needs to be located. Thus, new learning material should be framed and related to existing structures such that conceptual relationships and new meanings and concepts emerge. As Ausubel states;

> "Existing cognitive structure is the principal factor influencing meaningful learning and retention. Since logically meaningful material is always, and can only be, learned in relation to a previously learnt background of relevant concepts, principles and information which make possible the emergence of new meanings and enhance their retention, it is evident that the substantive and organisational properties of this background crucially affect both the accuracy and clarity of these emerging new meanings and their immediate and long term retrievability."

Learning is not interpreted in an elementaristic or molecular manner, but rather in terms of wholes and structures in which the relationships between parts and wholes are examined and used to assist learning. The acquisition of new knowledge needs to be undertaken in a manner which relates existing knowledge structures to new ones such that the configuration of the whole knowledge structure is changed in form within which the old and the new are related. Thus learning can be regarded as a process by which formal knowledge structures change and the parts that comprise them undergo transition by which their relationship to other parts and the whole system is altered. This is obviously an analogy of the process of development itself and suggests the view that learning and knowledge acquisition is a developmental process. Thus, the organismic model interprets learning in terms of developmental processes and concepts, in contrast to the mechanistic model which interprets development in terms of learning processes and concepts. The prior assumptions and interpretive orientation of each model is therefore, clearly identifiable.

The importance of meaning and interpretation is emphasised within cognitive accounts of learning. Perry (1970), in the quotation given above, indicates that internal formal structures provide meanings by which the world is interpreted and by which the need for understanding and prediction of events in the world is mediated and met. Again, and as Ausubel notes, learning can only proceed by meaningfully taking account of and relating new material to existing interpretive structures thus achieving a restructuring of the form of knowledge within the individual. In this sense, the acquisition of new meaning and knowledge is dependent upon and defined by the elaboration, contextualisation and semantic and logical analysis of existing meaning and knowledge. Bruner (1974) makes the point that cognitive structures not only give meaning and organisation to interpretations of the world (i.e. internal structural organisation yielding structural organisation of the external world), but they are necessarily the basis from which new learning emerges. Such structures represent the information given i.e. that already learnt, in terms of which new learning goes beyond. This process obviously involves a continuous differentiation and re-structuring as existing structures and the meaning they convey are modified and qualified within newer structures. Another illustration of the cognitive approach to learning and one that emphasises the importance of meaning and its relationship to internal structures is Marton's distinction between deep and surface level learning (Marton, 1975). The former type of learning involves structural processing and contextualisation of meaning whilst the latter involves a superficial, non-structural, rote-verbatim type of learning which leads to poor retention, understanding and academic success.

Bruner (1974) also draws attention to another feature of the organismic model and its application to learning i.e. the essentially active nature of the learner and learning. Knowledge construction and acquisition is not regarded as a passive or reactive process nor is learning regarded as something imposed upon the learner. In the same manner that the organismic model regards the organism as actively engaging in interpretation of the world (constructivism) so the learner is regarded as actively engaging and participating in what is learnt. This is relateable to some current interpretations of the gene - environment interaction which stresses the concept of transaction between these (Sameroff, 1975; Bell, 1968; Lerner, 1976, 1978; Lerner and Busch-Rossnagel, 1981). The latter stress the role of the individual as producers of their own development a point which, in the present context, may be interpreted as applicable to learning i.e. the role of individual learners as producers of their own learning. This approach emphasises individual processes in learning and is related to Ausubel's point (Ausubel, 1968), concerning the need to structure new material relative to the existing knowledge an individual possesses to facilitate the active learner in re-structuring existing and assimilating new material within a new structure. However, unless a learner is actively engaged in this re-structuring and re-interpretation the assimilation of new material will only occur at a surface level. The active involvement of the learner defines his/her role in his/her own learning but this can be facilitated by the teacher's use of knowledge structures relating the old to the new and is also represented by learners' regarding both types of knowledge as tentative hypotheses which they actively seek to verify, extend, elaborate or abandon in a continuous process of thesis, anti-thesis and synthesis.

Within the organismic model considerable emphasis is placed upon the nature and role of function i.e. development has an end state or purpose. Similarly, within organismic accounts of learning considerable emphasis is placed upon the need for learning to be purposeful. At one level this relates to the need for goals and objectives to be set for learners to gauge and structure their learning progress within. At another level, however, the emphasis on purpose in learning is closely related to the importance of meaning, both of which can be subjective. This obviously relates to the individual's role in their own learning in that the meaning and purpose they attribute to learning will significantly influence the learning process and its success or failure. A student who wishes solely to pass an examination in an instrumental manner has a purpose to his/her learning but the latter is not defined in the same terms as that used within cognitive learning theories. The purpose and meaning of learning are defined relatively to an objective beyond the learning of new material itself, the latter being of secondary importance. Within cognitive theories of learning purpose and meaning are defined intrinsically to the material to be learnt, in and of itself. The elements of activity and the relatedness of new material to existing knowledge will facilitate the generation and recognition of the relevance of and interest in learning. Thus, by the structured relating of old to new forms of knowledge and the consequent emergence of new interpretive and meaning systems, learning should become invested with a purpose and a function.

In the previous section the Humanistic school of psychology was included within the organismic model as a learning theory. In terms of the present section the reasons for this particular re-classification should be apparent in more detail. In accordance with the organismic model the Humanistic view regards man as active and totally subjectively involved in his/her interpretations of the world and reality. Thus, it adopts an active constructionist view of knowledge but extends this into an extreme form of subjectivity. Learning must be relevant and important (have meaning) to the learner and must therefore be related to the interpretive system or frame of reference possessed by the individual learner. Although the Humanists do not use such formal expressions, the importance of existing reference systems in learning is analogous to the formal structures mentioned within the organismic model. Such reference systems however, are not necessarily defined in terms of formal knowledge systems (e.g. history, politics, biology etc.), but can include all and any form of interpretive knowledge system (e.g. intuition, feelings, impressions etc.) and can therefore include, in principle, any categorisation of experience i.e. totally informal. Activity, i.e. doing, is the only way of acquiring meaningful experience and new knowledge. Therefore, the Humanistic school can be regarded as corresponding to the principles of activity, purpose, structure, form and transition included within the organismic model, but apply it in an essentially informal and experiential manner. Thus, the individual is regarded as being the best expert on him/her self and the one who must accept responsibility for choosing and defining which experiences, transitions and re-structuring is the most appropriate within the context of their life and development. A major diference between the organismic model and the Humanist theory is the "fixity" or rigidity of developmental stages and their sequencing. Although Maslow (1973) suggests a fixed sequential hierarchical structure concerning his stages of self-actualisation, the fixed order and mutual exclusiveness of these stages has been criticised empirically and more generally the Humanists can be regarded as agreeing in principle to the notion of hierarchical stages but they adopt a more open and subjective approach which denies their formal definition, categorisation and sequencing. The latter can only be done on a "post-hoc" basis and for a given individual relative to the interpretation of themselves and the world, which is in marked contrast to Piaget's "a priori" identification of universal stages in cognitive functioning. A given individual's development is interpreted as a process of being and becoming in terms of their recognition and realisation of their internal potential. Thus, change is given in that an individual is regarded as inherently active and changing, but the direction of that change can take a multitude of subjectively referenced and simultaneous forms. In this context, Maslow argues that conventional definitions of learning and the practice of education restricts and limits individual identities and development, since they create and impose a narrow extrinsic definition of human being and competence which reduces individual activity, change and the discovery of potential. Maslow's suggested alternative approach i.e. intrinsically oriented learning, contains the elements of activity, subjective interpretations of what is known and what needs to be known and an egalitarian approach to the possession of knowledge by all individuals i.e. knowledge is essentially subjective therefore all individuals possess knowledge.

As discussed above, the mechanistic model doesn't regard chronological age as intrinsically important since, although external stimuli and forces occur within a temporal dimension, they are not necessarily related to it and all reactive behaviors at any age can be explained by reference to basic laws and processes. In contrast, the organismic model is characterised by the necessary use of chronological age boundaries (Looft,

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1973).Although there is some disagreement concerning whether emphasis should be placed on relatively specific age boundaries delineating formal transitions or the invariant sequencing of such transitions, the general conclusion is that age is intrinsic to the concept of sequences of stages and forms of transitions (Baltes and Goulet, 1976). Thus, the mechanistic and organismic models view age as extrinsic and intrinsic to development respectively. The organismic model assumes that age is directly related to maturational and developmental processes (i.e. mainly biological and genetic) which underly invariant sequential changes and transitions. Within this view, age of itself influences and mediates internal structural transitions. External behaviors which are subserved and defined by internal structures and forms are, therefore, influenced inherently by age. Within the mechanistic model, however, age is not inherent to the behaviors observed since the latter are defined in terms of external stimuli and molecular, universal learning processes. For the organismic model, age is an irreduceable concept since the dynamic for internal structural change is directly related to it. For the mechanistic model age is not important since it can be reduced to a particular history of environmental events and their lawlike impact via basic laws. Baer (1970) suggests an essentially mechanistic interpretation of adulthood in that behavior change in this period is relatively unaffected by age, reserving for childhood and late adulthood the greater influence of this variable. Even within this, Baer suggests that childhood learning is capable of demonstrating a very strong environmental influence and that conventional statements about learning stages in childhood represent conventional environmental milieus rather than staements about actual learning ability.

This, of course, relates to the nature-nurture debate and demonstrates the similarity of the mechanistic/organismic models dichotomy to it. In terms of "main effect" models the nature-nurture debate is largely regarded as redundant since such main effect phenomena is relatively rare. Since Anastasi (1958) the majority of writers adopt an interaction/transaction interpretation of gene-environment relations (e.g. Sameroff, 1975; Bell, 1968; Lerner, 1976, 1978). Within these approaches the logical fallacy of attempting to seperate these two sources of developmental influence is recognised and development is regarded as a continuous process of mutual interaction. Some age specific developmental function is recognised, especially in childhood and with the proviso that these are dependent upon minimally necessary environments defined in gross terms at a group rather than individual level (Lerner, 1978). Piaget's theory of cognitive development, as mentioned previously, is a good example of the organismic model but this theory recognised the importance of the environment as the context within which maturational development occurred and which could facilitate or inhibit the speed and pattern of development but which, in most cases, permitted broadly comparable age-graded maturational development between individuals. In contrast, the mechanistic model argues that even if the existence of developmental age functions could be accepted in principle they would be "rendered irrelevant by the introduction of appropriate environmental manipulations",(Looft, 1973). As the nature-nurture debate and modern interpretations of it indicate this area and the organismic/mechanistic models issue is extremely complex, confounded (i.e. gene-environment/internal-external interaction) and very largely a matter of emphasis rather than an either-or dichotomy. In principle this undermines the entire approach of the present paper which adopts a dichotomous orientation and relates to meta-theoretical issues stemming from modern approaches to adult development and development itself. These issues and the justification for the present study were discussed briefly in an earlier section and will be referred to further below.

The organismic model has engendered the traditional understanding of the concept of development as one of progressive and increasingly complex expansion and elaboration. This has usually involved the stipulation that "....changes must be cumulative and irreversible if they are to be labelled development."(Nagel, 1957, p.16). Therefore, the organismic model usually regards development as uni-directional i.e. can only proceed in one direction with fixed statges following each other and that earlier levels or forms of organisation cannot be regained. Contrary to this conceptualisation, there is a suggestion in the literature that development can be regarded as bi-directional (i.e. it can take more than one direction) and that developmental regression occurs (Gergen, 1977; Baltes et. al. 1980). The organismic model denies this possibility and explains evidence in support of regressive development in terms of a failure to correctly identify the underlying structures and forms subserving observed behaviors. The organismic model suggests that materially identical behaviors can be produced by two qualitatively different structural forms of organisation which lead to a qualitative difference between these behaviors relatively to the function, form and context of the whole. In this sense, the attribution of a given piece of behavior to a previous, earlier form of internal organisation is regarded as inaccurate and fails to make the qualitative distinction between current and earlier behaviors. The mechanistic model, it will be recalled, allows for development to proceed other than unidirectionally (i.e. bi-directionally, multi-directionally).

Both the mechanistic and organismic models regard their descriptions and explanations in some senses as universal and as relative in others. For example, the organismic model assumes that the sequencing of developmental changes are essentially universal (e.g. Goodman, 1968) but that to some extent cultural, social, familial and educational factors can moderate the timing of such sequences (e.g. Rohmer, 1971; Tomlinson-Keasey, 1972). (This also demonstrates the manner in which environmental influences interact with and moderate maturational processes.). The mechanistic model regards the basic laws and processes of learning as inter-species universal but suggests that because each individual human experiences a unique constellation of external forces and stimuli each is uniquely different developmentally. Although the basic laws of learning are identical and universal for all humans the specific type and timing of environmental stimuli which determine behavior is different for every individual, therefore, each has been influenced by different patterns of such stimuli creating developmental uniqueness for each individual. At a simplistic level, the organismic model assumes developmental universals and learning relative to these whilst the mechanistic model assumes learning universals and development relative to these. Once again, the characterisation of the organismic and mechanistic models as "closed" and "open" developmental systems respectively, is evident.

### c) Mechanistic and Organismic Models: An Emergent Classification System:

From the above, relatively brief, description of the mechanistic and organismic models, a series of dichotomous interpretations in terms of several major dimensions of developmental characteristics seem to represent these models and especially the theories within them. Such an approach would provide a useful summary of the two models' view of development and learning (see Figure 6.). This approach could be incorporated within an organising framework for the discussion and locating of theories of adult development to be considered in the next section.

As a further input to the classification of theories of adult development and of different theories of development within the organismic model a brief description will follow of Van Den Daele's typology of qualitative models in developmental analysis (Van Den Daele, 1969). This typology is particulary useful since it permits a distinction between age changes (within person variation) and age differences (between person variation) (Bromley, 1981), and is therefore eminently suited to a developmental analysis. Van Den Daele's typology essentially comprises two major bi-polar dimensions (i.e. unitary-multiple; simple-cumulative) in terms of which organismic theories may be interpreted. The unitary-multiple dimension refers to whether theories specify that each stage is followed by only one possible developmental path (unitary) or by several (multiple). Thus theories are held to differ in terms of whether the progressions they describe exclude or include alternative development paths. The best examples of this difference are Piaget's and Erikson's theories. Piaget specifies a linear, single-stage sequencing in which each stage is preceded and followed by a specified other regarded as representing lower and higher levels of functioning respectively. Within each stage developmental sequences of a hierarchical progression are also specified in a single-step manner. By contrast, Erikson's theory, although describing eight invariant stages of development covering the whole life-span, specifies the availability of two alternative directions within each stage (e.g. trust vs mistrust) which have different developmental implications. Piaget's theory is obviously an example of a unitary theory whilst Erikson's theory represents a multiple theory. Differences between individuals of the same or

Metaphysical Models

| | Organismic | Mechanistic |
|---|---|---|
| Metaphor used | Organism | Machine |
| Nature of man | Active | Passive/Reactive |
| Source of change | Internal<br>Genetic | External<br>Environmental |
| Cause of change | Formal structures | Antecedent consequences |
| Direction of change | Teleological<br>"closed"<br>Uni-directional | Non-teleological<br>"open"<br>Multi-directional |
| Emphasis | Processes<br>(Mental) | Products<br>(Behavioral) |
| Nature of change | Qualitative | Quantitative |
| Nature of development | Hierarchical<br>Irreversible<br>Discontinuous<br>Cumulative | Non-hierarchical<br>Reversible<br>Continuous<br>Non-cumulative |
| Philosophical position | Constructivism | Naive realism<br>"copy theory" |

Figure 6: Organismic and Mechanistic Models;Major Dimensions of Classification.

different ages can be mapped in terms of both the unitary and multiple theories. Within the unitary theory differences between individuals can be categorised in terms of extent and rate of progress along the linear sequence of stages. Within multiple theories, differences between individuals can be categorised in terms of extent and rate of progress through the stages and in terms of which developmental paths were taken at each stage.

The simple-cumulative dimension concerns the extent to which prior developmental stages are retained and are recoverable within an individual. The simple end of the dimension concerns theories which prescribe that an individual can only occupy one stage at a time and doesn't retain alternative response options from an earlier developmental stage (e.g. regression). As Gergen states, "..the individual should not return to previous behavior patterns. Change should be uni-directional." (Gergen, 1977, p.147 ). Again Piaget's theory is a good illustration of the simple dimension in that an individual who has achieved formal operational thought is held not to be able to engage in concrete operational thought (an earlier stage). As discussed above, the uniqueness of formal structures subserving behavior prevent developmental regression since earlier structures have been subsumed and transformed by later ones and are not available as mediating forms. The cumulative end of the dimension refers to theories in which more than one stage may be available to an individual at any one time. Thus, successive elements are retained from each stage. Good examples of theories containing this characteristic are Kohlberg's theory of moral development (Kohlberg, 1963), the empirical results of which Van Den Daele argues demonstrates the retention of earlier stages, and Freud's theory in which earlier modes of functioning are available (e.g.

regression to earlier stages of libidinal expression at times of threat or frustration). The simple dimension allows for the classification of differences within an individual in terms of mutually exclusive different stages occupied at different points in time whilst the cumulative dimension allows a similar classification in terms of a repertoire of developmentally earlier responses available at a given point in time.

Van Den Daele combines both dimensions to yield a multi-dimensional classification system and provides examples of each (see Figure 7.). The distinction between Kohlberg's theory and Freud's theory resides in the fact that the former theory is regarded as a unitary theory (i.e. stages occur in a single invariant sequence) whilst the latter is regarded as a multiple theory (i.e. within each stage of development there are alternative developmental paths and trajectories), but both theories maintain the retention of earlier stages of functioning whilst occupying later ones (i.e. cumulative).

| | | Within person variation | |
|---|---|---|---|
| | | Simple | Cumulative |
| Between person variation | Unitary | Piaget's theory of cog-devel't | Kohlberg's theory of moral devel't |
| | Multiple | Erikson's theory of psycho-social development | Freud's theory of psycho-sexual development |

Figure 7: Van Den Daele's multi-dimensional classification of qualitative theories.(Van Den Daele 1969)

It may be worth noting that Van Den Daele's use of the term "cumulative" is not the same as that referred to earlier when discussing the organismic model. In that context the term referrd to the dependence of each successive stage of development upon the previous stage for its emergence and the higher level functioning of the subsequent stage i.e. stage 2 could not occur unless stage 1 had previously occurred. Within the organismic model although this notion of cumulative is essential it also necessarily involves the disappearance of earlier forms and structures as these give way to later ones thus preventing the retention of patterns of behavior subserved by those earlier structures. Van Den Daele's use of the term refers to the latter.

## SECTION FIVE

## Models and Theories of Adult Development and Learning

In this section an attempt will be made to review and analyse some of the major models and theories of adult development and learning utilising the classification system derived from the earlier analysis of the mechanistic and organismic metaphysical models. Although the analysis will include both development and learning the majority of models and theories concerning adulthood are typically developmental in orientation. Observations concerning learning are therefore necessarily derived and tentative and often do not go beyond generalised common sense. As mentioned earlier there is a need to regard development and learning as intimately related and synonomous in many respects. Whilst this can be achieved at a relatively simple level it is generally difficult to derive detailed learning characteristics from general developmental models and theories. This difficulty is exacerbated by the fact that models and theories of adult development are numerous and contain inadequately or undefined and contradictory terms and concepts which ideally require systematic codification. In addition, the extremely complex nature of their subject matter creates conceptual and lexical problems. The following section represents an attempt to unravel some of these problems but must be regarded as general and heuristic.

The underlying logic and rationale of this section and indeed of the whole paper, is based on the notion that conceptualisations of development and learning in the context of adulthood is held to inform the practice of the teaching of adults. All of the theories and models to be discussed in this section can be regarded as different interpretations of the developmental and learning characteristics of adults and as such are potential variables which may influence the nature of teaching.

In a general sense the whole field of models and theories relating to development can be characterised chronologically and conceptually in terms of a simple-complex continuum. (This can also be true of all forms of knowledge). Initially, theories and models were relatively simple (not meant in Van Den Daele's sense) and could be clearly interpreted in terms of the organismic or mechanistic models (Baltes et.al.,1980). Over the last twenty years or so theoretical interest in adult development and learning has dramatically increased leading to the formulation of more sophisticated and complex interpretations. This change has been reflected in a movement from uni-dimensional to multi-dimensional models and theories involving the inclusion of a greater number of variables and their complex interaction. Thus, theories and models have changed from monistic to pluralistic conceptualisations. Such changes carry meta-theoretical and paradigmatic implications since they challenge earlier paradigms and models, namely the organismic and mechanistic models (Baltes et.al.,1980; Gergen, 1977; Looft, 1973). This was briefly referred to earlier in the context of modern interpretations of the nature-nurture debate. Attempting to classify or consider newer models and theories in terms of earlier ones may be regarded as regressive and ultimately redundant, however, if current understanding is still based upon these earlier approaches it may be appropriate to map newer approaches in terms of older ones. This is to be consistent with Ausubel's point concerning the need to relate new material to existing knowledge to facilitate learning and understanding. Also the redundancy of the organismic and mechanistic models has not been demonstrated and it may still be the case that they offer comprehensive interpretive systems in terms of which new approaches can be located. Conversely, if, as Reese and Overton claim, it is not possible to mix metaphysical models within lower level models and theories, the pluralism and multi-dimensional nature of newer conceptualisations may indicate to what extent this has occurred and whether such newer models are untenable or represent the emergence of a new metaphysical model. Irrespective of these issues, the attempt to identify newer models in terms of older metaphysical models will serve as a useful procedure for demonstrating and describing the basic principles of the newer models and theories and the epistemological background and context from which they were derived.

### a) The Biological, Growth, Maturational Model:

This model has been ostensibly the most historically pervasive frame of interpretation used in adult development and learning. As Neugarten and Datan state;

> "From the ancient poets through Shakespeare to Erikson (1950,1959) people have viewed the life cycle as a series of orderly changes, from infancy through childhood, adolescence, maturity and old age with the biological timetable governing the sequence of changes....."
>
> (Neugarten and Datan, 1977, p.56)

In essence this model asserts that the process of ageing in all its aspects follows or parallels the biological sequence of growth to maturity followed by decline. Late adolescence/early adulthood is assumed to represent a state of maturity, "...the end state of a developmental change process..."(Baltes et.al. 1980), after which subsequent change is regarded as decline. Labouvie Vief (1980) refers to ageing within this model as a "...mirror image of growth and development." which she suggests is traceable to Ribot's law of the regression of intellectual functioning in ageing and pathology which obviously involves developmental reversal. Following the achievement of biological maturity, decline is assumed to occur in all other aspects of functioning as well as the biological and psychological. Neugarten states;

> "It has been easy to take growth as the model, to borrow from the biologist the concept of increasing differentiation and integration, and the concept of an

> end point towards which change is necessarily directed. It has been understandable therefore, that we have used the biological clock as a frame of reference, looking to biological change as the pacemaker of psychological; and taking for granted the intimate relationship between these two classes of phenomena."
>
> (Neugarten, 1968, in Allman and Jaffe (Eds), 1977, p.44.)

Thus, the biological metaphor of growth, maturity and decline provided the basis for conceptualising the process of ageing and was applied to every other mode of functioning. Consequently, decrements in competence and performance became the interpretive characteristic of adulthood and ageing. As Schaie and Labouvie-Vief state;

> "Through well over half a century of research on cognitive functioning in adulthood and old age, a pattern of general and differential intellectual decrement appears to have emerged as one of the best replicated findings in psychological gerontology."
>
> (Schaie and Labouvie-Vief, 1974, p.305)

The biological model of adult development and learning therefore can be seen to contain two assumptions, namely;

i) bio-physical functioning declines after maturity,
ii) other forms of functioning parallel the bio-physical.

Both of these assumptions, but especially the latter, have been the subject of considerable recent revision.

Decline in bio-physical functioning with ageing has been well reported within the literature (see Bromley, 1981). The pattern of such decline is usually characterised as commencing shortly after late adolescence/early adulthood and comprises a gradual decline through adulthood up to late adulthood when the rate of decline is held to increase markedly. In this process both genetic and environmental factors are important and interact. Thus, smoking for example, shortens the life span for some individuals more than others (genetic effect, assuming comparable degrees of smoking), but generally it does shorten the life span of all who do smoke (environmental effect). The traditional interpretation of such decline is that it is irreversible i.e. that bio-physiological progressive dysfunction is an inevitable concomitant and definition of ageing and adulthood. However, Woodruff (1973), whilst accepting that some degree of bio-physical functioning inevitably declines with age, suggests the possibility that some of this decline is reversible and recoverable via intervention strategies. One example of the traditonally regarded inevitable bio-physical decline with age is the progressive slowing of brain wave rhythms in elderly subjects. Woodruff demonstrates that by the use of bio-feedback intervention some recovery of earlier wave rhythms can be achieved. Similarly, mild exercise in the elderly and late

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adulthood can result in some bio-phsyical and cognitive function recovery (Labouvie-Vief and Gonda, 1979). Often, in this context, reference is made to the "disuse theory" of bio-phsyiological decline by which such decline is interpreted in terms of environmental factors leading to the lack of use and exercise of the bio-phsyical system resulting in loss of function. This is characterised in the "use it or lose it" principle (Masters and Johnson, 1966). The conclusion would therefore appear to be that whilst some bio-physiological decline may be inevitable with ageing and may be irreversible due to biological factors, a proportion of this decline is reversible. The latter may be attributed to the influence of environmental factors and the response of the biological system to mild changes in the status of these factors. However, this interaction may occur at a more fundamental level than hitherto appreciated and for present purposes indicates that the biological model of adulthood and ageing need not involve decline in bio-physical functioning to the extent previously assumed.

The second assumption of the biological model i.e. that other modes of functioning, particularly the intellectual and cognitive, parallel the bio-physical, provided the underlying interpretive framework for the negative relationship traditionally found between age and a variety of psychological variables (Foster and Taylor, 1920; Miles and Miles, 1932; Botwinick, 1967; Horn, 1970). Thus, for example, the ability to learn was regarded as declining with increasing age and supported the popular maxim, "you can't teach an old dog new tricks". The negative relationship between age and intellectual performance was usually supported by studies using a cross-sectional research design which has subsequently been found to confound age with cohort effects (Schaie, 1965). Conversely, studies using a longitudinal research design generally reported a stable or positive relationship between age and intellectual performance, however, such research designs have been identified as confounding age with time-of-measurement effects (Schaie, 1965). Both types of research design therefore yield impure measures of ageing effects. Later methodological developments (Schaie,1965; Baltes, 1968) provide more accurate measures and empirical studies incorporating such methods have not supported the decrement interpretation of intellectual performance over time (Schaie and Stother, 1968; Schaie and Labouvie-Vief, 1974). Different intellectual performance has been found between groups of different ages (between cohort differences) but such differences are largely attributable to inherent differences of the subjects arising from their membership of different cohorts which have experienced distinct environmental milieus. Within cohort differences (within the same age group) have not been found to be significant and generally display a stable or positive relationship across time. Similarly, a distinction is often drawn between competence and performance in interpreting the intellectual performance of adults, the general point being that poor performance does not necessarily imply poor competence since a variety of cognitive and non-cognitive factors intervene and distort the relationship between performance and competence

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(Hulicka, 1975; Woodruff and Walsh, 1975). In some senses the competence of adults can be regarded as superior or equivalent to that of young adults and in these respects the term "decrement" requires substantial qualification. Finally, the relationship between bio-physical factors and behaviors has also been subject to revision. Woodruff (1973) suggests that the traditional view of this relationship has been that bio-physiology determines behavior, and suggests that a reversal of this i.e. behavior determining bio-physiology, is equally valid as bourne out by environmental intervention studies. Birren (1963) postulates a discontinuity relationship between behavior and bio-physiological functioning provided that the latter does not decline to pathological levels which are regarded as influencing behavior. Within this theory normal bio-physiological ageing is not regarded as a major influence upon behavior until such functioning is reduced to very low levels.

Thus, in many respects the biological-decrement model has been substantially discredited in its application to conceptualisations of adulthood. It must be noted however, that it is not totally discredited and does have a part to play in understanding adulthood and that despite its relegation in importance, the use of this model of development influenced conceptualisations of learning competence and performance, thus illustrating the link between development and learning.

The biological- decrement model of adult development clearly falls within the organismic metaphysical model. Depending on what assumptions are made concerning the relationship between bio-physical functioning and other modes of functioning, this can be in an "as if" or literal manner. In the former the postulated decline in other modes of functioning merely follows the pattern of the biological mode without any necessary causal connection. In the latter, decline in bio-physiology is held to underly and to be necessarily causal in the decline in other modes of functioning. The latter interpretation has been the most common and represents a biological, internal source of changes with age. This is consistent with the organismic model but has the added assumption that after maturity such internal locus of change prescribes developmental decline. As mentioned above, current models and theories of adulthood and development disagree with such a uni-dimensional explanation of change in adulthood. Biological and genetic explanations of changes in adulthood (and childhood) are not generally regarded as sufficient in themselves.

Within the organismic metaphysical and biological models (though not necessarily utilising decrement as a developmental concept), a set of more specific theories of adult development exist which are not restricted to describing the pattern of adult performance relative to age. They do this but in accordance with the organismic model they describe internal structural forms of development in adulthood. These will be discussed in a further sub-section below together with life-cycle phase theories. As will seen, these theories collectively and individually pose many conceptual difficulties concerning the nature of adult development.

b) The Stability Model:

In contrast with the biological-decrement model the stability model emphasises the stability and continuity of adult behavior patterns over time (Gergen, 1977; Baltes et.al.1980). The previously mentioned longitudinal studies demonstrating stability in intellectual performance although imperfect support this model together with the findings of research studies incorporating modern refined design strategies (e.g. Schaie and Strother, 1968). Similarly, studies of a variety of personality variables also demonstrate stability of these across substantial periods of the adult life-span.

Conceptually the stability model is supported by the view that early experience in childhood determines later behavioral outcomes thus bestowing a stable and determined behavioral profile in adulthood. As Baltes et.al. state;

> "....earlier structures and experiences are not merely important but are primary in determining subsequent behavioral development."
>
> (Baltes et.al.,1980, p.94)

This notion is referred to within childhood development as the "critical periods" thesis and posits in the manner of Freud and others that early development and experience determine later behavior. Freud argued, for example, that development within the first seven years of life was critical in determining the adult personality. Similarly, but from a different perspective, early behaviorist learning theorists (e.g. Watson, Thorndike) postulated that the nature and type of early environments and thus of early learning, would determine later personality and behavior. This view has been challenged by Clarke and Clarke (1977) who recognise the impact of environmental factors upon development but dispute that early environmental factors determine later behaviors in the absence of the continuation of such factors. Thus the continuity of environmental factors from childhood to adulthood will create stability in behaviors, but in the absence of such environmental continuity behaviors may vary between early and later time periods. Early theorists argued that behavioral plasticity and recovery from early adverse environments was limited to childhood or early adolescence. Clarke and Clarke suggest that behavioral and developmental plasticity exists much further into the life span including early and early-middle adulthood. Also as part of this orientation they suggest that conventional notions of stable development within childhood and adolescence can be challenged in that such development in many respects can be categorised in terms of marked discontinuities and leaps rather than a steady or stable progression (e.g. Brim and Kagan, 1980). This notion of a complex and changing system of continuities and discontinuities is apparent in some of the adult development literature, although the overiding ethos in comparison to childhood and adolescence, is one of greater stability relatively speaking. This is usually based upon the decline in importance of genetic and biological factors within adulthood as sources of discontinuity but leaves open the question of discontinuity as a result of environmental factors. Kohlberg offers a biological model interpretation of the stabiltiy model when he states;

> "After early adulthood, biological notions of development are notions of either stabilisation or decrement in biological functioning....."
> (Kohlberg, 1973, p.181)

Similarly, many writers refer to the genetic predisposition of stable behavior and personality variables throughout adulthood (Eysenck,1967; Jensen,1969). If a biological (and organismic model) interpretation is adopted the difference between the biological decrement and stability models resides in the pattern of biological ageing after maturity. However, as discussed above, conceptualisations of the stability model can also focus on environmental factors. To whatever extent environmental factors can be regarded as relatively paramount a mechanistic interpretaion of the stability model is indicated in that this metaphysical model focusses on external (i.e. environmental) causes of change and stability. In addition and more obviously, the mechanistic model describes development as essentially continuous and stable, whilst the organismic model describes development as essentially discontinuous thereby indicating the mechanistic ethos of the stability model. It could also be argued that if the biological stability notion as descriptive of the period after maturity was adopted, stability could equally be accounted for within the organismic model.

### c) The Decrement-Stability Model:

As the title indicates this model posits the co-existence of both decrement and stability features in descriptions of adulthood and adult development. In contrast to the decrement and stability models individually, these features are not either-or options in a mtually exclusive sense but are rather seen as simultaneously existing in a complementary but opposing fashion. Such descriptions are usually referred to in the context of cognitive and intellectual variables. The previously referred to longitudinal and cross-sectional studies provide some support for this interpretation. In this context Labouvie-Vief notes the tension these findings created in terms of the decrement and stability uni-dimensional models and states;

> "In research on ageing both decrement and stability were the rule."
> (Labouvie-Vief, 1980, p.5)

The best example of the decrement-stability bi-dimensional model is Cattell's notion of "fluid" and "crystallised" intelligence (Cattell, 1963; Horn, 1978), in which the former is defined in terms of genetically mediated biological and neurological substrates underlying some types of intelligence (reasoning and spatial abilities) and the latter is defined in terms of socio-cultural knowledge acquired by environmental experience within a given cultural context (verbal and numerical abilities). Generally these two types of intelligence have been regarded as possessing different developmental profiles in ageing. Fluid intelligence, in accordance with the biological model, declines with age whilst crystallised intelligence, in accordance with the mechanistic model, increases or stabilises with age (Labouvie-Vief, 1980). Individual intelligence tests within the Wechsler Adult Intelligence Scale have been identified in these terms as "hold" and "don't hold" tests relative to individuals' performance over time (Bromley, 1981; Salthouse, 1982). In addition, these two types of intelligence and their different ageing profiles have been held to be in a complementary and compensatory relationship in that the decline in "fluid" intelligence is compensated by the increase/stability of "crystallised intelligence yielding a stable but componential pattern of intellectual competence in ageing. It is important to note that Cattell's theory of fluid and crystallised intelligence clearly distinguishes between and regards as if they were independent, biologically and social-environmentally mediated types of intelligence. This is in contrast to Hebb's notion of intelligence A which represents innate intellectual potential (genotype) and intelligence B which corresponds to the level of innate potential realised via environmental interaction (phenotype) (Hebb, 1949). Thus Hebb's theory is a more dynamically interactive theory in terms of genetic and environmental factors than is Cattell's which clearly separates these sources of developmental change and regards them as independent.

In terms of the organismic and mechanistic metaphysical models the components of the decrement-stability model are clearly recogniseable not simply because decrement=discontinuity (i.e. organismic model) and stability=continuity (i.e. mechanistic model) but also, and perhaps more importantly, because the origins of these characteristics are identified as different. Thus ageing decrement is regarded as being due to biological factors (internal, organismic model) whilst stability is attributable to social environmental factors (external, mechanistic model). The two characteristic components of the decline-stability model fall within opposing metaphysical models and interpretations of the world. It can be argued, of course, that the decrement-stability model does not "mix" metaphysical models since in Cattell's theory decrement and stability are distinguished and treated in a relatively independent manner. In Reese and Overton's terms this could be regarded as an example of "good eclecticism". However, one major aspect of metaphysical models, it will be recalled, is that they can explain eveything and therefore their partitioning and differntial application to separate phenomena would appear to be contradictory within a single overal scheme which does not appear to recognise the origin of these factors. In terms of modern approaches to the nature-nurture relationship, Cattell's theory is clearly inadequate since it retains their independence. Hebb's theory is far more appropriate to such orientations but totally confounds the metaphysical model origins of this continuum. This may be exactly what is required of a new meta-theoretical development in which the traditional epistemological boundaries and systems of conceptualisation are dissolved and reformulated within newer terms and concepts which make them consistent.

Finally, it should be noted that Labouvie-Vief (1980) describes "fluid" intelligence as "mechanistic" (p.5). There is a sense in which the genetic, biological and physical systems can be regarded as machines. The important difference between the organismic and mechanistic models then becomes one of descriptions and explanations of different machines. This can be regarded as a meta-metaphysical model issue (i.e. a model of metaphysical models) in which the organismic and mechanistic models are re-classified under a wider interpretive scheme. Within such a scheme the difference between the organismic and mechanistic models would still exist but would be theoretically capable of integration. This issue is beyond the scope of the present paper, however, it may be pertinent to note that a lot of current models and theories of adult learning and development can be interpreted as attempting an integration/synthesis of the organismic and mechanistic models at a detailed rather than meta-model level.

### d) The Ordered Change Model:

This model shares many features of the organismic metaphysical model in that for most of the theories falling within it changes in adulthood are specified and are described in a sequential, age-graded (loosely defined), universal, uni-directional (teleological) and irreversible manner. Thus, changes over time are orderley and obey an identifiable and patterened sequencing. Achievement of the full developmental sequence described by these theories is not axiomatic and depends upon a facilitative environment and (in some theories) genetic/biological capacity. There are however, marked differences between some of these theories concerning whether, for example, developmental sequences are hierarchical and whether the source and inertia for change resides predominantly in internal-biological or external-social environmental factors. The majority of theories stress the latter in adulthood in contrast to the traditional biological decrement model previously discussed but also admit the presence of biological factors.

Theories falling within the ordered-change model can be sub-divided into two basic types, although there are strong differences within each of the two sub-divisions. These sub-divisions correspond to the following;

1) developmental stage theories,
and,
2) life cycle/phase theories.

Each of these types of theories will be described seperately and issues arising from them discussed.

### 1) Developmental Stage Theories:

This sub-division is taken to include Piaget's theory of cognitive development (Piaget, 1983), Kohlberg's theory of moral development (Kohlberg,1971), Loevinger's theory of ego development (Loevinger, 1976), Perry's theory of intellectual development (Perry, 1970), and Erikson's theory of psycho-social development (Erikson, 1950, 1974). All of these theories have been included because they are essentially developmental in a specific sense and because they all have implications for or are directly related to the concept and description of adult development. In this context it may appear unusual to include Piaget's theory which is predominantly referred to in the context of childhood and adolescent cognitive development. However, since Piaget does not envisage further cognitive developmental stages in adulthood, the nature of adult cognition which characterises adulthood as, "....a kind of perpetual late adolescent period." (Chandler, 1976, p.226), is being made. This and the fact that Piaget's theory is almost without exception referred to and regarded as the archetype of theories of its kind merits its inclusion.

All of the above theories describe development in terms of identifiable and sequential stages which are hierarchically arranged and which describe mode specific functioning in terms of a progressive movement from simple to more complex, abstract and differentiated operations. Each of these theories contains the assumption that higher levels in the developmental progression and sequence provide access to superior and preferred forms of functioning compared to earlier levels i.e. the stages are hierarchical. Similarly, each of these theories is teleological in that the developmental sequence is directed towards a stipulated end state or mature stage. Developmental progression is conceptualised as occurring only within the linear sequencing of the stages although theories differ in the extent to which developmental options exist within stages (Van Den Daele, 1969). Not only is developmental progression restricted to the sequential stages stipulated by each theory but such development is generally regarded as uni-directional i.e. development is only described in terms of upward movement the hierarchical levels. Regressive development in terms of a movement from higher to lower levels is not regarded as possible. In these terms these theories can be regarded as closely related to and falling within the organismic model. However, there are some important differences and points of departure relative to the organismic model and between idividual theories.

Piaget's theory is the only clearly biological theory in a literal sense, from within this group of theories. That is, it does not describe or explain development in terms of a biological metaphor or template since it explicitly invokes biological, maturational processes within its theoretical framework as directly relating to changes in childhood cognition. This is one reason why Piaget's theory only concerns childhood and why it does not envisage further developmental stages in adulthood, since, as Baltes et.al. (1980) note, age-graded genetic and biological influence can be regarded as predominant in chlidhood but progressively weakens with increasing age beyond adolescence. Kohlberg makes the same point when he states that,

> "A direct biological model of stages is unlikely to postulate adult stages."
> (Kohlberg, 1973, p.181)

The logic being that after late adolescence/early adulthood biological development in the sense necessary to form the basis for a new stage has ceased or has declined. Although Kohlberg accepts the existence and importance of biological development in childhood cognitive development in the sense that Piaget does, he regards biological maturation and cognitive development to the formal operational level as a necessary but not sufficient condition for moral development in adulthood. Thus, the stages of moral development specified in adulthood are not dependent upon further biological maturation beyond adolescence and early adulthood. The other theorists within this sub-division would similarly appear to discount the biological maturational notion in its literal sense or regard it as irrevelant to their descriptions.

Kohlberg (1973) explicitly states that his theory is the only one that concerns the concept of structural changes in adulthood. In insisting on this he distinguishes between structural development (i.e. internal, formal, psychological structures) and development defined in terms of socio-cultural and social role tasks. With the exception of Piaget, the other theorists within the present sub-division (i.e. development stage theories) are regarded in the latter terms i.e. non-structural stage theories. The terms Kohlberg invokes to define this group are very similar to those which other writers have used to describe the life cycle /phase theorists which comprise the second sub-division within the organismic model. In Kohlberg's terms therefore, he and Piaget are the only structural stage theorists with himself as the only structural stage theorist positing the possibility of such development within adulthood. Kohlberg's view implies that all other theorists can and should be placed within the life cycle/phase theory categorisation, but this, it can be argued, omits some important differences between stage development theorists and life cycle/phase theorists. Whilst it may be correct to state that other stage development theorists do not pay as rigorous or as much attention to internal structural forms in a formal sense, the titles of the theories alone indicate their concern with internal psychological structures (e.g. "ego development", "ego crises", "intellectual development" etc.), yet these may not be as specific and well defined as in Kohlberg's theory. In this sense it may not (from Kohlberg's point of view) be sufficient that such theories address the psychological and therefore adopt an internal perspective and focus with less well established and relatively informal structural relations between and within stages. In contrast, life cycle/phase theories adopt a more obvious social orientation, and although in some cases (e.g. Erikson's theory of psych-social development) this emphasis is a matter of degree rather than either/or, the distinction is valid to merit their differentiation. Another difference is that the life cycle/phase theories tend to be less distinctive in the particular descriptive orientation they adopt although their explanatory positions can be as diverse as the stage development theorists are in their positions. The former appear to concentrate upon socially derived aspects of personality whilst the latter include moral, intellectual, ego and personality dimensions. Finally, the stage development theorists adopt an "a priori" methodology in contrast to the "post hoc" methodology of the life cycle/phase theorists in which principles of description more so than explanation are derived after empirical research (Looft, 1973).

Theories within the development stage sub-division of the organismic model differ in the time span and location in life where development is held to occur. Piaget's theory is restricted to childhood and adolesence but development thereafter remains static in terms of stages. Erikson's theory covers the entire life span. Perry's theory considers intellectual development in early adulthood but only for a restricted population i.e. college students. Loevinger's and Kohlberg's theories, similarly, have only been elaborated in terms of early adulthood but in principle could be extended to cover the whole of adulthhod. Highly specific age-graded differences are difficult to establish or quantify due to the increasing importance of experience and the environment in adulthood in facilitating or inhibiting individual development change. This is another difference between the stage development theories in that, for obvious reasons, Piaget's theory is the most age-graded specific in comparison to the other theories which can only specify general and restricted age-graded parameters due to the greater heterogeneity of adults and their contextual milieus and the uncertainty and unpredictability this entails (Gergen, 1977). It must be noted, however, that even Piaget's age-boundaries for developmental periods are approximations and are subject to individual variation.

In terms of Van Den Daele's typology all of the developmental stage theories, with the exception of Erikson, can be regarded as falling within the simple-unitary description i.e. an invariant sequence of single option stages (unitary) together with occupation of only one stage at a time (simple) (Looft, 1973). Erikson's theory conforms to the simple dimension but specifies the existence of several developmental options within each stage (i.e. multiple). As mentioned previously, Van Den Daele regards Kohlberg's theory as cumulative (i.e. functioning within different stages simultaneously possible), however, Kohlberg is reported to regard his theory as simple (Looft, 1973). In terms of the organismic model, previous analysis concluded that the simple-unitary description most closely conforms to its theoretical criteria.

Having briefly discussed some of the similarities and differences between the developmental stage theorists an attempt will now be made to examine some of the issues arising from them in the context of their typical conceptualisation of adulthood and adult development.

A major point to be noted is that all of the developmental stage theories describe developmental change within adulthood. Even Piaget's theory which concerns childhood development describes or allows some developmental change in adulthood although this is not regarded as representing a distinct developmental stage. Piaget does not totally discount the possibility of cognitive stage development in adulthood, but is of the opinion that this is unlikely (Kohlberg,1973). The remaining theorists explicitly stipulate and describe adult development stages within the subject domains of their theories. Thus, development change within adulthood is accepted. This may appear trivial, however, in view of the traditional definition of development within the context of childhood it is a point worth emphasising.

Given that adult development exists the next question is, "What is it/". What does this development comprise and how can it be conceptualised? Perhaps a useful distinction to make in answering this question is that between, within-stage development (i.e. intra-stage development) and development which involves movement from one stage to the next (i.e. between-stage, inter-stage development). Intra-stage development can occur within intermediate stages or the final stage (i.e. the "mature" stage). Inter-stage development can only occur between intermediate stages and is not possible after achievement of the final stage or the end point of the developmental process. Given hierarchical structure of development stage theories these two types of development can be further described in terms of vertical development (inter-stage development) and horizontal development (intra-stage development). In a prototypical developmental sequence these two types of development are obviously intimately interlinked. Horizontal, within stage development leads to the acquisition of structures and competencies which yield access to a higher stage (vertical, between stage development). However, although this process of development is regarded as axiomatic and universal, an individual's rate of progress and achievement of the final or any intermediate stage is not and is subject to a variety of potentially inhibiting forces and factors (e.g. genetically mediated mental retardation, adverse environment limliting developmental progress). Again, the point made earlier concerning the relative weakening of biological factors as influences upon adult development and the corresponding greater dependence upon heterogeneous, diverse and uncertain environmental factors makes the occurrence of adult stages less axiomatic and more difficult to identify.

Within the terms of Piaget's theory adulthood essentially comprises intra-stage development. That is, whatever cognitive stage has been reached at the end of adolescence the adult remains within. The only exception to this is where a slow developer in adolescence achieves the concrete operational stage and may develop formal operational thinking in early adulthood. Apart from this, adulthood, and particularly early adulthood, is regarded as comprising the application of formal operational thought to more areas and activities and/or the stabilisation of this level of thought relatively to earlier stage mediated thought (Piaget, 1972). (Stabilisation refers to the fact that at any given stage elements/characteristics of the next or previous stage can be present and that the use of the higher stage functioning systematically and progressively replaces functioning appropriate to the lower stage). A similar interpretation of adulthood can be suggested for the remaining stage development theories with added difference relative to Piaget that both inter and intra stage development extend further into adulthood since these theories regard development between stages as occurring after adolescence. Erikson, for example, regards his stages of psycho-social development as continuing throughout the life span, whereas the other theorists, with the exception of Piaget, currently stipulate such development in the first part of adulthood. In this connection, Kohlberg speculates upon the existence of a seventh stage of moral development occurring in some individuals in middle or later adulthood.

Thus, adulthood is conceptualised as involving the potential development of stages and the stabilisation and application of whatever stage is achieved whether that be an intermediate or the final stage. There is no inevitability concerning development to the final stage or indeed development between intermediate stages. Kohlberg, for example, indicates that progression to stage 5 moral reasoning and development depends on the prior acquisition of stage 4 and a combination of personal experience (contingent environmental factors) of moral responsibility leading to questioning and commitment together with cognitive and moral stimulation creating reflection. Whether or not this combination of pre-requisites occurs within an individual's life and if so, where in the life span, is obviously unspecifiable. Similarly, but in a different manner, Erikson's theory permits an individual to proceed through different periods of his/her life without resolving and therefore developing beyond the first ego crisis (trust vs. mistrust) which can be subsequently resolved depending upon the detailed psychological and social experiences encountered by the individual. In one sense, adult development stage theorists describe potential stages of adult development but are unable to specify whether, when and at what rate such developmental stages will be achieved. This problem seems to become progressively more difficult for each successive stage. Thus for example,whilst stage 4 moral development may be acquired by the majority of adults, whether and when stages 5 and 6 are acquired is far more tentative (Kohlberg, 1973). Erikson's theory is more complex in this respect since, as discussed previously, it is a multiple theory and allows for the existence of options (e.g. trust/mistrust; identity/confusion; integrity/despair) within each stage. Development is defined in terms of successful resolution of these crises. The social and psychological environment will present these crises in a sequential and axiomatic manner, but development can only proceed via successful resolution of each. A failure to resolve one crisis prevents resolution of subsequent ones. Thus an individual could accumulate a series of unresolvable crises via the failure to resolve a previous crisis. The patterning and sequencing of such resolutions and obstacles to them is obviously an individualistic and relative matter.

In addition there are two problems relating to the generalisability of development stage theories. Firstly, the majority represent abstract systems of universal invariant developmental stages which are isolated from individual life histories. Secondly, in terms of Perry's and Kohlberg's theories empirical and theoretical formulation are based on a population in, or which has attended, college. This suggests that such stages of development that have been found in adulthood by these theorists, may be restricted to specific higher social class and intellectual level populations. As Kohlberg notes, the experience of being responsible for the welfare of others may be a pre-condition for the development of stage 5 moral reasoning but of itself will not create this. There may be many adults who have this experience but who do not achieve stage 5 moral development becuase of low social class and intellectual status.

Another major issue in the context of adult development stage theories is the possibility of "regressive development" in adulthood. Some evidence has been offered in support of the view that adulthood comprises developmental reversal and regression to cognitive levels below that of Piaget's formal operational stage (Allman, 1981; Long et.al. 1979). As Gergen notes;

> "In the case of both cognitive and moral development, ample evidence for "regression" or reversal in sequence has been discovered, and such evidence raises serious questions concerning the predictive capability of the basic theoretical structures."
> (Gergen, 1977, p.146)

Labouvie-Vief regards developmental regression in adulthood as axiomatic within development stage theories and sees it as a manifestation of the biological-decrement model. As she states;

> "On the surface, the case for regression and decrement as a main defining element of cognitive ageing appears so firmly established that to present an alternative may be considered a hopeful but blind denial of an inevitable deteriorative course of later life development."
> (Labouvie-Vief, 1980, p.3)

From this perspective, developmental stage theories are regarded as linearly cumulative in the sense that later stages represent increasingly complex and abstract conceptualisations of the world which are all based on initial and identical sensory and perceptual input data. Stages of development are regarded as successive layers of increasingly abstract interpretations by which the same sensory and perceptual data are classified. Development is thus regarded as a hierarchy of progressively more complex, abstract and superior forms of abstraction and interpretation of invariant sensory and perceptual experience. Application of the biological-decrement model to those hierarchical layers of abstraction produces a necessary prediction of reduced and declining ability to perform such abstractions and interpretations. The sequence of this decline is the reversal of initial acquisition. In terms of Van Den Daele's typology the accumulation of levels and stages of abstraction are cumulative but not simultaneously i.e. earlier levels of functioning are recoverable in a uni-directional but reversed manner. As Labouvie-Vief states;

> "The only way in which one can represent ageing then, is by what Coombs has called a "first-in - last-out" sequence (or alternatively, a "last-in - first-out" sequence). Thus ageing is in effect pictured as a mirror image of growth and development."
> (Labouvie-Vief, 1980, p.9)

In this sense Labouvie-Vief sees developmental stage theories as imposing abstract systems of hierarchical classification as definitions of development in which, she argues, decline and regression are necessarily inferred from the hierarchical ordering and complexity of these levels and the decrement model of ageing. She does not accept the conceptualisation of development and adulthood portrayed by these theories but insists that they necessarily involve a reversal of developmental progression in adulthood. Such developmental regression is later regarded (by Labouvie-Vief) as a mis-nomer and one which represents a faulty interpretation of adult development and adaptation. In contrast, Gergen (1977) is equally dissatisfied with developmental stage theory accounts of adulthood and adult development and regards developmental regression data as valid and as seriously questioning the predictive validity and usefulness of these approaches. Thus, they both criticise the development stage view but from different perspectives.

In terms of the organismic model's interpretation of development the view put forward by Gergen is the correct one, i.e. developmental regression is impossible. Similarly, the cumulative retention of earlier stages of function is regarded as equally impossible with both accounted for by the integration and structural transformations of earlier structures as a result and as part of the developmental process. As Baltes et.al. (1980) note, loss of functioning in elderly subjects cannot be taken necessarily to indicate regression. This refers to the classic distinction within the organismic model between competence and performance in terms of which regression is attributable to a faulty inference about competence from performance. As discussed previously, the organismic model regards identical behaviors between two stages as being based upon different formal structures. To attribute such behavior to the existence of structural forms belonging to an earlier stage is to confuse competence with performance and ignores the contextual and functional differences between different stages.

A final issue arising from the developmental stage theories is that concerning stability and continuity of development. Both the organismic and mechanistic models can be regarded as continuous in an explanatory sense i.e. they both uphold the continuity and universality of the principles they use to explain development. At a descriptive level however, (and in terms of the content of their explanations), they bifurcate. The organismic model regards development as essentially discontinuous comprising qualitatively different and hierarchically organised and sequenced internal forms and structures. The mechanistic model sees development as essentially continuous comprising qualitatively equivalent but quantitatively different accumulations of behavior determined by environmental causes and antecedents with no inferred source of sequencing or progression other than external chronology. As mentioned previously, there is a sense in which the organismic model can be regarded descriptively as continuous and representing stability. This notion resides within the very concept of uni-directional, teleological development and concerns the proposition that although qualitatively different stages are prescribed by a teleological sequence, that sequence itself displays descriptive continuity and stability. Each subsequent stage depends upon achievement of a particular prior stage which forms the basis for the subsequent stage and the formal transformations involved in the following stage. The stages and their fixed sequencing are invariant and are therefore continuous even though they involve qualitative discontinuity in their particular developmental content. There is also another sense in which the organismic model's description of development can be held to be continuous rather than discontinuous. This involves questioning whether distinct stages can be identified given their intimate inter-dependence and inter-connection. This view does not challenge the basic assumptions of the organismic model i.e. uin-directional, teleological, qualitative development, but suggests that the entire developmental process is complex and interwoven to the point of abandoning empirical description of developmental stages (e.g. Child, 1981). This obviously involves accepting continuity as the descriptive characteristic of development within the organismic model.

## 2) Life Cycle/Phase Theories;

As stated previously, life cycle/phase theories possess many of the features of the organismic model. They describe ordered, sequential changes in adulthood which are age-graded (i.e. linked to chronological age) and which are usually concerned with personality and personal perspectives. However, the explanation for these changes is not based upon biological metaphor but is rather based upon the social framework and the existence of an age-status social system of roles and expectations. As Neugarten states;

> ".....the biological components of human development take a certain precedence in viewing personality change in childhood and early adolescence and perhaps also in the very last part of the life span when biological decrement may overwhelm other components in the personality. There remains, however, the span of the adult years - a period of now approximately 50 years, beginning when the organism reaches a biological maturity around age 20 and extending to approximately 70. In this long part of the life span the biological model is obviously insufficient, and we need a social framework for understanding the timing patterns that occur."
>
> (Neugarten,1968; in Allman and Jaffe, 1977, p.45)

These theories are critical of the developmental stage approach to development and regard it as containing concepts and methodologies based on child oriented development notions which, it is argued, are inappropriate for conceptualising and describing adult changes and development. In particular, because developmental stage theory is based upon the biological model it is regarded as omitting a major source of influence upon adult development i.e. the social context. Consequently, attention is focussed upon socially derived systems of age-graded norms and expectations which are held to be the major source of developmental change in adulthood. Again as Neugarten states;

> "Expectations regarding age-appropriate behavior form an elaborated and pervasive system of norms governing behavior and interaction, a network of expectations that is embedded throughout the cultural fabric of life for the adult as much as the child. There is a prescriptive timetable for the ordering of life events: a time when men and women are expected to marry, a time to raise children, a time to retire. This pattern is adhered to, more or less consistently, by most persons in the society, and even though the actual occurrences of these events are influenced by various life contingencies, it can easily be demonstrated that norms and actual occurrences are closely related."
>
> (Neugarten, 1968; in Allman and Jaffe, 1977, p.45)

In terms of the organismic and mechanistic metaphysical models life cycle/phase theories present several major issues. These are;

a) use of the biological metaphor,
b) discontinuity of development,
c) focus on the origin of change within adulthood,
d) predictability and methodology.

Although the life cycle/phase theories (with one exception) eschew the biological metaphor it can be argued that in some senses they do implicitly incorporate it. Their descriptive schemes are strongly age-graded and extend through the whole of adulthood in a relatively rigid and structured manner. As mentioned above, developmental stage theory tends to emphasise early adulthood and cannot predict if and when adults will reach potential stages. Life cycle/phase theory, in contrast and relative to a given social system, can identify the whole sequence and timing of socially mediated and predictable changes throughout adulthood (i.e. at a normative level). In this sense, life cycle/phase theory is more age-graded than developmental stage theory even allowing for the fact that some detailed theories emphasis social role rather than chronological age (e.g. Lowenthal et.al.,1975). As will be recalled from previous analysis, regarding chronological age as intrinsic to the developmental process is a characteristic of the organismic model. Similarly, and in addition, the age-graded system of social roles and expectations possess a structured and sequential progression with fairly rigid characteristic phases identifying different sections of the life span. These phases interact and depend upon each other and proceed to a finite end phase. In this the organismic model's emphasis upon qualitatively different, uni-directional and teleological development would seem to be approximated (Looft, 1973). Thus, whilst developmental phases are socially relative, all social systems are held to possess and necessarily specify structured age-status systems which prescribe different behaviors, actions and perspectives at different points in the life span. Life cycle/phase theory describes developmental change in a manner similar to the organismic model but explain such changes in terms of social rather than biological factors. This can also be interpreted as a parallel movement away from predominantly psychological (i.e. mainly child development) to sociological approaches to adult development.

Although opinions differ (Looft, 1973), life cycle/phase theory can be held to regard the different phases it describes as qualitatively different (Cross, 1982), thereby indicating that development can be described as discontinuous although it does not ascribe a hierarchical framework for interpreting different and distinct phases and cycles. Each is different from the others in terms of expected behaviors, appropriate perceptions etc. but none is superior i.e. the experience of getting married is qualitatively different from the experience of having children but neither is superior to the other. Of course, it can be argued that qualitatively each phase or cycle is equivalent to every other and that they only differ quantitatively in terms of the empirical behaviors they involve. At a more fundamental level however, reference is sometimes made or implied to structural changes within the individual which, whilst not suggesting these as primary causes of behavioral change, does recognise the existence of internal mental structures in development i.e. that social systems and their age-graded norms and expectations have their incidence at the individual psychological level (Neugarten and Datan, 1973). This is consistent with Erikson's recogonition of the importance of socio-cultural contexts in defining the detailed manifestation of ego crises and their resolution. The only difference here would seem to be that life cycle theory regards the social system as determining both the process and content of psychological development, whereas Erikson stipulated psychological processes a priori, the content of which was heavily influenced by the social and cultural context. In this sense, life cycle/phase theory can be held to regard psychological, internal mental structures as derived from and secondary to the social system.With this important qualification therefore, it could be argued that life cycle/phase theory approximates the organismic model in terms of both the discontinuity of development and the implied reference to internal, mental, psychological structures which change as successive phases/cycles are encountered.

It is worthy of note here that although Cross (1982) regards life cycle/phase theories as essentially discontinuous, she regards developmental stage theories as describing development as continuous. The latter point, according to previous analysis, contradicts the organismic model but retains a major difference between developmental stage and life cycle theories. The present analysis disagrees with Cross and regards both approaches as describing development in adulthood as discontinuous.

Cross (1982) regards the methodological difference between life cycle and developmental stage theories as that between horizontal vs. vertical progression relatively. Horizontal progression (life cycle theory) emphasises age changes within individuals, whereas, vertical progression (development stage theory) emphasises age differences between individuals. This distinction relates to the traditonal longitudinal and cross-sectional research designs previously mentioned and the emergence of newer research designs which overcome problems encountered with the former. It also ignores between individual analyses of life cycle data and ignores within individual analyses using developmental stage theory and as such can be regarded as relatively simplistic.

At a deeper level, Looft notes that the methodologies and interpretations of life cycle theory, ".are clearly mechanistic in character..."(Looft, 1973, p.45). Frequent reference is made to predicting adult accomplishments, age-graded behaviors and the discovery of "predictors" of later life adjustment. This analysis is clearly mechanistic in that behaviors (in both childhood and adulthood) are regarded as the result of a set of identifiable and quantifiable causal factors i.e. antecedent-consequent relationships. Thus, the locus of change is regarded as external the major parameters of which can be identified and related in a causal manner to the behavior and perspectives of different age-graded groups and individuals within the social system. To this extent, life cycle theory must be regarded as contradicting the tenets of the organismic model and conforming to those of the mechanistic model. Looft acknowledges the fact that life cycle theory defies neat categorisation in terms of the organismic and mechanistic models but argues for an organismic interpretation on the grounds that it (life cycle theory) represents man as active and generating changes upon the environment. Whilst this may be true at a global societal level it would not appear to be so at the individual level since the behavior of individuals is determined by the social system which, relatively to the individual, forms the external, environmental context. The society-individual relationship is obviously extremely complex but for present purposes the direction of influence expressed in life cycle theory is clearly of the former influencing the latter (i.e. society---->individual), which entails an external source of developmental change upon the individual.

It must be noted at this point, and as hinted at earlier, not all of the theories within life cycle theory can be regarded in this manner. Cross (1982) refers to a major controversial issue within life cycle theory in that Levinson et.al. (1974) regard adult age-graded differences as genetically mediated, a point which indicates the possibility of evolutionary perspectives within ageing (see Baltes et.al.,(1980). Lowenthal et.al., (1975), however, emphasise social roles rather than age-grading of social roles as the major mechanism for the definition of life cycles and phases. In the context of the present paper, the former theorist would appear to conform most closely with the organismic model whilst the latter theorist would conform to the mechanistic model's extrinsic regard for age-graded changes. There is clearly, as Cross notes, "...a continuum among researchers regarding the role of age."(Cross, 1982, p.171).

As indicated above, the emphasis of life cycle theory upon social factors can be regarded as an expansion of the factors that can be held to influence and determine the nature and pattern of development, both child and adult. The detailed theories within this general approach form part of the pluralistic and multi-dimensional orientation and conceptualisation of adulthood. The "mixed models" view that many of such approaches entail indicate meta-theoretical issues surrounding the organismic and mechanistic models. Life cycle theory can be regarded as part of a reaction against the conceptual limitations of child oriented developmental stage theory and the limitations of earlier research methodologies.

### e) The Dialectical Model:

This model is conceptually difficult not least because of its comprehensiveness but also because it postulates that our current

systems of conceptualisation themselves are socio-culturally and ideologically determined in a manner which is narrow and restricted in a fundamental sense.
At a simpler level, Riegel (1979) is as critical of Piaget's developmental theory and other mentalistic theories as he is of mechanistic interpretations such as American behaviorism, but for different reasons. Piaget's theory is criticised for its failure to include the social context of development. Thus, whilst Piaget's theory integrates biological and psychological factors in development it does so in the absence of any consideration of the social and cultural milieu from which it emerges. It also only considers development in childhood and adolescence. Conversely, whilst mechanistic interpretations include the social context within the general environment and consider development beyond adolescence, they ignore the individual and the truly social, cultural and political because of their reductionist approach (i.e. basic laws and processes). The social context is reduced to a set of quantifiable, physical stimuli and indivduals are correspondingly reduced to responding subjects.

Riegel argues that notions of development in both childhood and adulthood need to be conceptualised in terms of at least four interacting dimensions. These are;

a) inner-biological,
b) individual-psychological,
c) cultural-sociological,
d) outer-physical.

These dimensions possess different time profiles but a major change in one will influence one or more of the others. For example, a major earthquake or economic depression will involve changes in the biological, psychological and social dimensions. Similarly, biological changes (e.g. onset of sexual maturity, major illness) will cause major changes to the psychological and social dimensions and perspectives of individuals. Within this framework, development is regarded as a possible set of crises representing the conflict between at least two of these dimensions and the emergent synthesis and re-adjustment involved. A major psychological event (e.g. onset of clinical depression triggered by the loss of one's spouse/child/parent) is held to cause conflict and be contradictory with earlier established biological and social modes of functioning which will necessitate change in these. In similarity with life cycle theory emphasis is placed upon the social-historical-cultural dimension in influencing individual perspectives and developmental profiles. This is consistent with current methodological emphasis upon research designs which take account of between and within cohort and generational differences (e.g. Shaie and Labouvie-Vief, 1974). The fact that one generation grew up with "pop" music, computers, the atom bomb and free compulsory education up to the age of 16 should be taken into account in describing and comparing this generation with earlier generations. Similarly, cultural-historical changes within a given cohort's life span could create changes which research methodologies should be sensitive to.

Generally therefore, the dialectical model is pluralistic. The meta-model issue contained within it is clear in that the biological, psychological and social perspectives are differentiated and integrated within a single model. In this sense both the organismic and mechanistic models are included and assimilated. Internal and external foci of developmental change and stability are included. Qualitative and quantitative developmental change is permissible with both terms placed within an integrated framework. In terms of the dialectical model the organismic and mechanistic models' interpretations appear relatively simplistic, rigid and un-balanced accounts of a vastly complex, dynamic and interactive system comprising the interrelationships between four major developmental dimensions.

In addition to and as a function of specifying these four developmental dimensions as a conceptual framework, Riegel also suggests a scheme of developmental analysis which summarises and integrates the contradiction between the organismic and mechanistic models. This also relates to the qualitative and quantitative distinction found in these developmental models. This scheme revolves around the distinction between internal structural change and change in information i.e. information exchange. The mechanistic model is regarded as representing an "open" developmental system in which internal structure (i.e. innate neurological wiring mediating basic laws and processes of learning), remains invariant and the organism can receive new information about the environment in a flexible and open manner. Within this, learning is defined by the acquisition of a new stimulus-response unit, the organism's capacity to acquire such new information by this process is regarded as virtually limitless. New behaviors indicate new learning which represent the detection of a novel changed stimulus-response relationship between the organism and the environment. The detection of such relationships represents the exchange of information from the environment to the organism i.e. environmental contingencies alter (new information), these are learnt by the organism(information exchange) and behaviors are adjusted or emitted accordingly. This process and the concept of information exchange correspond to the mechanistic model's stipulation of quantitatively different but qualitatively equivalent behavior and development.

The organismic model is regarded as representing a "closed" developmental system in which information about the world remains invariant but internal structures alter to yield new interpretations of the same phenomena. This is very similar to Labouvie-Vief's view that Piagetian developmental stage theories are based on the same basic sensory and perceptual data but specify different levels and ways of structuring that data in progressively hierarchical levels of abstraction. In this scheme the environment is regarded as presenting the same information to the organism but developmental changes in the latter determine the different interpretations made of it. This corresponds to the organismic model's emphasis upon qualitative developmental change (different ways of interpreting the same information),indicates the constructionist philosophy underlying it and the central role of the active organism in interpreting the world.

Riegel argues that a more dynamic and comprehensive developmental analysis should involve both types of systems and differential degrees to which each of these characteristics may be present. He therefore proposes treating each of these aspects as opposite ends of a continuum and suggests a simple matrix by which systems may be categorised and compared (see Figure 8).

| | Open | Closed |
|---|---|---|
| Open | Information exchange only. | Mixed information exchange and structural change. |
| Closed | Mixed information exchange and structural change. | Structural change only. |

Figure 8: Open and Closed Development Systems (Riegel,1979)

At a deeper level the dialectical model is based upon a fundamentally different philosophy and definition of logic than other traditional theories and models. Traditional logic insists on invariant identity i.e. an entity A can only be A and cannot be any other (B,C or not A). It is thus fixed and rigid in terms of pure, formal logical analysis. Hegelian dialectical logic on the other hand posits that such invariant identity of phenomena is impossible and essentially illogical. In this system of logic all matter are seen as essentially changing and therefore containing within them the contradiction of their identity at a fixed point in time. Change and contradiction are therefore inherent and all material phenomena are viewed as being in a ceaseless "flux". The egg contains its own contradiction i.e. the chicken it becomes. The seed is contradicted by the plant it becomes which is also contradicted by changes in the plant over time leading to its eventual termination. An individual human is never exactly the same from moment to moment, thus contradicting itself and the invariant identity requirement of pure, formal logic. This analysis forms the basis, in its application to social and political systems, for the Marxist dialectic i.e. the inevitable evolution of societies through Feudal, Capitalistic and Socialist forms. It also forms the basis, in its application to developmental psychology, for an alternative view of cognitive development in childhood and adulthood.

Riegel (1979) and Novak (1971) suggest that dialectical thinking is superior to and incorporates formal logic. The latter is regarded as necessary to man's technical and epistemological control of the environment but that its limitations and imbalance should be recognised. All humans are held to be endowed with dialectical logic and thinking i.e. the ability and tendency to interpret phenomena as changing, contradictory entities in terms of a variety of dimensions and aspects. Westernised educational systems are held to be largely informed by Piagetian developmental notions which enshrine the tenets of formal logic and fixed, invariant identities. Such systems succeed in conditioning out natural dialectical thinking in everyday thought within childhood and adolescence. Thus, formal Westernised compulsory education and the measurement systems they use (e.g. intelligence tests) are held to emphasise convergent thinking and answers i.e. the single solution, rather than emphasising divergent thinking based on question formulation and contradiction. Upon the completion of compulsory education and entry into adulthood a resurgence of dialectical thinking is held to occur. Following on from Piaget's four stages of cognitive development Riegel suggests that dialectical thinking corresponds to a fifth stage of cognitive development occurring in adulthood. Some evidence for the existence of dialectical thinking and cognition exists within the literature although this is very tentatively regarded (e.g. Arlin, 1975; Lamiell et.al., 1983; Buss and Craik, 1983; Buss, 1979). It must be noted that although Riegel posits the existence of a fifth stage of adult cognitive development corresponding to dialectical thinking, he also stipulates that this type of thinking exists in childhood and adolescence but is inhibited by rearing and educational systems. It is always present and defines human cognitive functioning but is subdued during formal education and resurfaces, as it were, after the end of formal education in early adulthood.

Thus, the dialectical model not only provides a multi-dimensional framework for conceptualising general factors involved in developmental processes but it also specifies a theory of adult cognition. In both of these emphasis is placed on conflict, contradiction and disequilibrium with temporary states of equilibrium. This is in direct contrast to Piaget's theory which Riegel suggests emphasises equilibrium and temporary states of disequilibrium.

Although the dialectical model can be regarded as integrating both organismic and mechanistic models, Reese and Overton (1970) note that the fundamental philosophical basis of the organismic model is Leibnitz's concept of the inherent activity of mind and matter and that this is related to Hegel's concept of developmental dialectic. The possibility is therefore raised that the dialectical model is essentially organismic in its emphasis upon change and activity. In a sense this must be true, however, there are important qualifications. Riegel's criticism of Piaget involves the notion that the latter's theory of development embodies a valid principle but distorts and limits it in execution of the theory itself. The link between biology and psychology, which is one of the objectives of Piaget's theory, is included within Riegel's theory but is extended to other major dimensions which includes the socio-cultural. Also, the principle of activity and change within Piaget's theory is defined in terms of states of equilibrium the most important being the final stage of cognitive development i.e. formal operational thinking. From Riegel's perspective this distorts and contradicts the principle of inherent change and activity both in childhood and adulthood. Within childhood the emphasis upon equilibrium and formal logic is fundamentally misguided and unbalanced and seeks to remove activity and change. Similarly the entire developmental sequence in Piaget's theory is directed towards the cessation of activity and change i.e. a teleological theory which incorporates change and activity in the process of developing towards a stage where developmental change and activity do not exist. From Riegel's point of view this stipulates a static conception of adulthood and childhood development.

The dialectical model appears to be a potentially useful approach to the conceptualisation of life-span development in terms of the range of dimensions and their interactions it includes (Baltes et.al., 1980). However, it has not, as yet, satisfactorily specified the detailed nature of its descriptions or explanations. The status of the dialectical model as a theory of logic may be a far more open question. Formal logicians and philosophers disagree with the notion of dialectical logic in that, if everything is contradictory then this must apply to dialectical logic itself i.e. the contradiction of contradiction. This approach leads to a conclusion which is clearly untenable from the dialectical view i.e. there is no contradiction. Similarly, because dialectical logic eschews the conventional positivist methodology of experimental psychology and because contradictions are difficult to define operationally (a product of different philosophical approaches entailed within each), direct empirical evidence supporting the claims of the model are difficult to establish.

### f) The Contextualist - Aleatory Model:

This model is regarded as being conceptually close to the dialectical model (Gergen, 1977) and posits that the factors which determine development should be regarded as an uncertain confluence, the precise configuration and incidence of which cannot be predicted or estimated between different time periods. As Gergen notes;

> "In effect, the confluence may be viewed as a cross-time emergent. Thus, just as we cannot derive psychological principles from physiological knowledge, or one phase of development from a pre-existing phase, we cannot be certain of the nature of the confluence at time 2 from our knowledge

> at time 1. In other words, the relationship between any X factor and Y response is potentially unreliable; all relationships between antecedent factors and responses are fashioned in part by historically specific conditions. In the broadest sense it may be said that the determining confluence is subject to chance, and thus aleatory in nature."
> (Gergen, 1977, p.149)

This model, like the dialectical model, accepts the multi-dimensional nature of development but emphasises external environmental factors as socio-historical circumsatnces and generational differences between cohorts. In the context of the latter, reference is made to several studies demonstrating the existence of different developmental trajectories found among different cohorts within the same culture (e.g. Schaie and Strother, 1968; Baltes and Nessleroade, 1973; Woodruff and Birren, 1972). Such cohorts obviously represent the incidence of different and historically specific confluences of developmental factors. Although individual (i.e. ontogenetic) factors are recognised as influencing development they are regarded as too embedded within other major external factors and their effects, to discern. Individuals are regarded as representing unique ontogenetic factors and profiles which interact differently with major and relative environmental factors. The occurrence of the latter is unpredictable and their interaction and resulting developmental predisposition relative to ontogenetic factors, correspondingly unspecifiable. Developmental change is therefore subject to chance in the particular configuration of environmental factors impinging upon an individual and the interaction of this with ontogenetic factors. Age graded developmental functions are therefore not specifiable within the terms of this model. This is in contrast to life cycle/phase theory which also emphasised external, environmental (social) factors in development. The difference may reside in the different scales and orientations adopted by these two approaches. Although both mechanistic (see below) life cycle theory adopts a sociological approach wheras Gergen adopts a psychological approach within the Behaviorist position and which allows the reduction of all environmental events to stimuli. The latter can include socio-historical events across several generations but doesn't adopt, necessarily, a sociological perspective. Another difference between the two approaches is that whereas life cycle theory attempts prediction of behavioral development within a given cultural-social context, the aleatory model suggests unpredictability and uncertainty.

As noted when discussing life cycle theory, reference to external environmental factors as predominant indicates allegiance to the mechanistic model. The same conclusion applies to the aleatory model in that considerable emphasis is placed upon external factors. As Gergen states;

> "To the extent that such influences [external] predominate the aleatory position gains strength.

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> Environmental factors are subject to gross modification over time; they do not evolve on a constitutionally [internal] based schedule."
> (Gergen, 1977, p.149)
> (Bracketted entries added by author)

In addition, the aleatory model would also appear to be close to the mechanistic model in the terminology and concepts it uses to describe environmental factors. As the penultimate quote from Gergen indicates, environmental factors and individual reactions to them are couched in terms of stimuli and responses. Similarly, Amhammer's social learning approach to development and its use of antecedent-consequent relationships, reinforcement contingencies etc.(Amhammer, 1973), is regarded as support for thecontextualist model, further indicating the mechanistic orientation of the aleatory model.

Given the mechanistic ethos of the aleatory model it may be asked why it eschews prediction, a characteristic of the mechanistic model. The answer would seem to reside in the unique confluence of environmental factors which individuals and groups are held to be influenced by. The mechanistic model only predicts prediction in terms of identical environmental factors and forces and this is usually limited to a single or small number of stimuli. If environmental stimuli are numerous and their precise configuration in combination cannot be determined a priori, prediction becomes impossible since the stimulus environment is constantly changing.

Change is not necessarily implied by the aleatory model, such change as may occur depending upon chance environmental factors. Levels and hierarchies of developmental progression are not specifiable and the organismic concepts of uni-directional and irreversibility of development have no meaning. Age is not regarded as an intrinsic factor in development and there is no significant reference to the biological model. The aleatory model therefore corresponds to the mechanistic model.

### g) The Life-Span Development Model:

As Baltes et.al.,(1980) note, this view of development does not correspond to a particular theory or model but rather represents an orientation which integrates and combines many different descriptions and explanations of development. It is argued that it is only within such a pluralistic context that the relativistic and embedded network of factors and variables invoked by individual accounts of development may be properly comprehended.

As the title implies, the model emphasises and attempts to suggest a developmental theory which covers the entire life-span. This is in contrast to the traditonal dichotomous treatment of childhood and adulthood development and the use of notions and concepts from the former in consideration of the latter (Neugarten, 1960). Such an approach can also be understood as an attempt to broaden and deepen the understanding of development; to find concepts and variables which cover the entire life-span but whose specific roles and influence can be differentially quantified or described in a relative sense at different points together with their mutual interaction.

Baltes et.al. note four major assumptions which are the basis for this orientation.

i. Developmental change can occur at any point in the life-span from birth to death.
This assumption is contrasted with the biological growth, maturational model which specifies developmental change only during the period of biological maturation with stability thereafter until late adulthood. This of course, does not apply to the biological decrement model which specifies development after maturity, however, the emphasis upon biological sources of development is discounted within the life-span model and a variety of other sources are referred to. The life-span orientation recognises the importance of biological factors in development but doesn't adopt any conceptualisation of "maturity" (biological or otherwise) as a signal for the end of development. Any point in the life-span can be an occasion for significant development.

ii) Development involves the expression of ontogenetic and evolutionary principles.
Because development involves long periods of time it must include the expression of ontogenetic (i.e. individual, genetic) change and socio-historical and cultural change. Biological and social age-graded changes at the individual level differ with respect to different aspects of behavioral development and different periods of the life-span. At the socio-historical-cultural level differences in these contexts influence the expression of ontogenetic development. Cohorts represent different socio-historical contexts in that they are influenced by them, but cohorts provide links between generations in terms of inter-generational consistency and change between different contexts. These linkages and their functions have evolutionary significance both socially and biologically.

iii) Conceptualisations of development need to be pluralistic.
The child-oriented, biological growth developmental stage theory (organismic model) description of development is regarded as too rigid and "monolithic" to be appropriate for development across the life-span. Life-span development is not regarded as uni-linear but rather as multi-linear involving the emergence and disappearance of cognitive and social behaviors relative to different time periods in the life-span. Developmental change can vary in terms of onset, duration, termination and directionality in a fundamentally more open and flexible manner than that described by developmental stage theory. A major feature of this pluralistic view is that because adults become

more heterogeneous with age the utility of chronological age and temporal order as indicators of major developmental change declines. In addition to more open and pluralistic descriptions of development, the life-span orientation also involves similar perspectives in terms of the explanations of development which all assume interactional, contextualistic principles. Intra-organismic explanations of development are not regarded as sufficient for development over the life-span. Considerable emphasis is therefore placed upon social-cultural factors and contexts and their interaction with ontogenetic factors both of which extend across the life-span. Similarly, life-span development is interpreted in terms of multi-causal and multi-dimensional sets of interactive influences.

iv) Life-span development provides an integrative framework for descriptive and theoretical paradigms.

Because of the comprehensiveness of the life-span orientation it provides the possibility of integrating specialist knowledge from a variety of developmental perspectives (e.g. infancy, childhood, adolescence, adulthood, ageing), different theoretical approaches within these and poses meta-model and meta-theoretical questions which challenge and attempt to reformulate the "elementaristic" approach of earlier paradigms.

As an illustration of the life-span development approach and the assumptions upon which it is based, Baltes et.al. offer a methodological paradigm. They stress that their methodological model "..is not a theory." (p.75), but rather a way of indicating and assisting the search for causal relationships and variables. The model comprises two basic determinants (the biological and environmental) and their interaction which find expression in three sets of influences upon development (see Figure 9).

| BASI DETERMINANTS | INFLUENCES ON DEVELOPMENT | | |
|---|---|---|---|
| Biological | Normative Age-Graded | ---------->} | |
| Interaction | Normative History-Graded | ---------->} | INTERACTION |
| Environmental | Non-Normative | ---------->} | |
| | TIME | ⟶ | |

Figure 9: Life-Span Developmental Model.
(Baltes et. al., 1980, p.75)

The three sets of influences are characterised as:

i) normative age-grade (ontogenetic) influences,
ii) normative history-graded (evolutionary) influences,

iii) non-normative life events.
Biological and environmental determinants are found within each set of influences for which a provisional life course profile is indicated (see Figure 10).

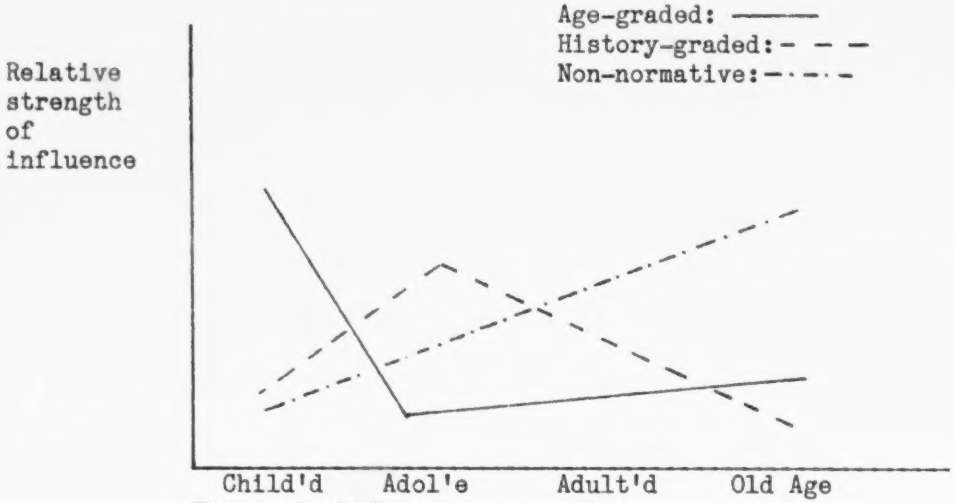

Figure 9: Life-course profiles
(Baltes et.al., 1980, p.77)

### i) Normative age-graded (ontogenetic) influences.

These are defined as biological and environmental determinants which have a relatively strong relationship with chronological age (e.g. biological maturation and age-graded socialisation - family, education, occupation) and are what traditional child oriented developmentalists regard as the major source of influence on development. The suggested life course profile for this set of influences is characterised by a peak in childhood followed by reduced importance in adulthood with perhaps a second, lesser peak in advanced old age. The rationale for the decline in importance of this set of influences in adulthood is the progressive weakening of biological and socialisation forces, although life cycle theory would disagree with the latter. The secondary peak in old age is attributed to the possible increase in importance of biological factors during this period.

### ii) Normative history-graded (evolutionary) influences.

This set of influences upon development refer to biological and environmental determinants associated with historical time and cohort historical contexts (e.g. economic depressions, wars, major epidemics, feminism, technology, etc). Baltes et.al. suggest that this set of influences has its major impact in adolescence and early adulthood during which the generational socio-historical foundation of adulthood is laid. After adolescence and early adulthood the importance of these influences is regarded as declining although some exceptions to this are noted, indicating that cohort-generational effects can occur at extreme ends of the life-span continuum.

iii) Non-normative life events.
These influences refer to biological and environmental determinants that do not follow a normative age or history graded sequence. They have their incidence upon individuals in a relatively random and unpredictable manner. Such events are often referred to as "life events" (Holmes and Rahe, 1967) and include changes in career, geographic residence, health status (major illness, accident), occupational status (unemployment, retirement), marital status ( marriage, divorce, seperation) and penal servitude. The postulated life-span profile is one of increasing importance in which such events become more important in determining the course of later development. The rationale for this is the decline of genetic control with age and the increased heterogeneity and uniqueness of life experience paths represented by adulthood.

Needless to say, all of these influences interact with each other at the individual developmental level and yields a picture of development which is fundamentally different from that indicated by either the organismic or mechanistic models. As Baltes et. al. note, the joint impact of these influences;

> "....account for the nature of life-span development, for its regularity and also for its differential properties in terms of inter-individual differences, multi-directionality and multi-dimensionality."
> (Baltes et.al., 1980, p. 76)

As may have been observed, the model described by Baltes et. al. owes many features to the dialectical and contextualistic models which are acknowledged by these authors as representing the, "... most useful for understanding the propositions of life-span development..." (p.80). Their emphasis upon multi-dimensional and cultural-generational contexts and historical time interactive influences upon biological, psychological and social determinants in adulthood and childhood is clearly recogniseable. In referring to the dialectical and contextualistic models as the most useful to a life-span development perspective, Baltes et.al. invoke the meta-theoretical and meta-model issues arising from these views. As mentioned above, they regard the organismic and mechanistic models as elementalistic in approach and conceptually too rigid and inadequate to account for the complexity and heterogeneity of life-span development and adult development in particular. As Neugarten (1968) notes, but in a different context, there would appear to be an incongruity between theoretical concepts and theories and the transactions and events that constitute everyday adult behavior and development. The methodological model suggested by Baltes et. al. can be regarded as one attempt to expand conceptualisation of developmental processes and factors and their relationships in order to reduce this incongruity. However, it must be remembered that it is only a tentative methodological model not a detailed, content specific theory.

In terms of the organismic and mechanistic models, the life-span developmental model obviously contains elements of both. At a simple level it includes both biological and environmental determinants within each of the three sets of influences it specifies. The intrinsicness of chronological age is accepted for the normative individual set of influences in which both biological and environmental forms of such grading is referred to. Within this the organismic model is adhered to in that linear, biological maturational development in accordance with developmental stage theory is not inconsistent with normative biological age-graded development. The latter can be regarded as hierarchical, qualitative, uni-directional and irreversible, but this is subject to the effect of the environment during development, is influenced by cultural-hstory graded and non-normative life events, is essentially restricted to childhood and adolescence and does not preclude the simultaneous existence of other developmental factors and dimensions which may be held to posses directly opposite characteristics and features. Thus, the organismic model is heavily qualified by the dimensional and variable context in which development is more broadly defined by. The mechanistic model is similarly qualified at the normative individual level in that socialisation influences (i.e. environmental determinants) are restricted to the pre-adult period, is subject to interaction with biological, cultural-historical and non-normative factors and is age-graded. As noted previously, the mechanistic model does not regard chronological age as intrinsic to developmental behavior. The mechanistic model is therefore represented in terms of the inclusion of environmental factors but is contravened with regard to the inclusion of chronological age as a descriptive system of classification.

In terms of the non-normative individual set of influences, inclusion of the organismic and mechanistic models is again apparent but in amanner which contradicts both. Non-normative life events can, from a general developmental perspective, be regarded as chance elements. This does not mean that they are acausal, only that the reasons for their occurrence are individualistic and do not follow a normative, nomothetic pattern which can be included within generalised developmental progressions. This contravenes the organismic model's view that development is sequential, linear and teleological although it does conform to the model's stipulation that prediction of detailed development behavior is not possible. With regard and in contrast to this point, the mechanistic model did specify the possibility of prediction. As noted ealier, Gergen, (1977) adopts an essentially mechanistic approach but postulates the heterogeneity of the stimulus environment as an explanation for lack of prediction. To the extent that the life-span model incorporates the aleatory and contextualistic view, it also contradicts the mechanistic model in this respect.

The organismic model is reflected in the mormative history-graded set of influences but biological determinants are usually referred to in terms of events such as major epidemics, health improvements, which have their origin in environmental factors but their impact upon biological ones. Reference is made to the existence of genetically mediated developmental behaviors such as reproduction and the rearing of offspring although this is subject to the influence of the other two sets of influences. Once again the organismic model is heavily qualified. Environmental determinants within the normative history-graded set of influences (e.g. wars, economic depressions, earthquakes etc) would appear to be paramount relative to biological determinants since the former include social-cultural definitions which evolve historically. These systems and the events they represent may have biological repercussions (e.g. improved health via free school milk), however, the incidence of totally biologically mediated changes can be regarded as relatively few in number compared to scio-cultural mediated changes. To this extent, the normative history-graded set of influences would appear to be largely environmental and external to the individual and therefore corresponds to the mechanistic model. The life course profile for this set of influences, however, displays a discontinuous pattern which contravenes the mechanistic model's stipulation of continuity.

Thus, from the organismic and mechanistic model's perspectives the life-span development model represents a confusing and often contradictory expression of some of their characteristics. This is not surprising given that the latter model can be regarded as attempting to offer an integration of these earlier models within a fundamentally different perspective. At the centre of the life-span developmental model is the notion of biological and environmental interaction which, although not specified in detail (this was not its intended purpose) is methodologically located within different types/sets of influences which interact with each other. Assuming that both biological and environmental factors are sub-divisible (e.g. biological: genetic,bio-chemical, physiological, neuronal, etc./ environmental: social, economic, political, geographical etc.), a truly complex and dynamic representation of developmental influences emerges when interactional relationships between any and all of these factors are applied in the context of the three sets of influences referred to by Baltes et. al.. Although both the organismic and mechanistic models accept the notion of interaction, to a greater or lesser extent, the life-span developmental model has, without specifying in detail, implied the fundamental and complex nature of this interaction in a developmental perspective so as to render such dichotomous views redundant. This relates to a previous discussion concerning current views suggesting the total confounding of genetic and environmental influences (Lerner, 1976, 1978; Scarr and McCartney, 1978).

### h) The Adaptive Model of Adult Cognition:

It is innaccurate to refer to this model as a "model" or a theory since it derives from a single reference (Labouvie-Vief, 1980) and makes no pretentions to be regarded as such in a formal detailed sense. Also, it only concerns one aspect of adult functioning rather than several and although this is not unusual (e.g. developmental stage theories) where it does occur it is typically within the context of a detailed formal theory.However, the view to be considered carries important implications for conceptualisation of adult development particularly in terms of developmental stage theory and, therefore, the organismic model. It also represents a specific example of the multi-dimensional model and contextualistic approach to development advocated by the dialectical, aleatoryand life-span models and contrasts these with the stage development approach in terms of adult cognition.

As briefly mentioned earlier, Labouvie-Vief interprets cognitive developmental stage theory (e.g. Piaget) as being based on the principle of linear cumulation which involves the notion that successive levels/stages of hierarchical, complex, cognitive abstractions are built upon the same sensory and perceptual data. Developmental progression is constrained and defined by the addition of successively higher levels/stages of abstraction culminating in the final "mature" stage. Development beyond this stage is interpreted by Labouvie-Vief as a regression down the developmental hierarchy at successively lower levels in a "first-in - last-out sequence. It must be noted that in offering this interpretation Labouvie-Vief is attempting to draw conclusions from stage developmental theory in accordance with the principles of the theory, as she reads it. She is therefore claiming that developmental regression is axiomatically implied by stage developmental theory. Labouvie-Vief notes that this regressive view of development in adulthood is contradicted by the fact that the earliest decrements in adulthood are usually in terms of sensory and psycho-motor capabilities i.e. if development in adulthood does involve regressive sequencing on a first-in - last-out basis, such capabilities would be the last ones to be lost rather than the first ones since they were the first to be acquired initially. On these and other grounds Labouvie-Vief suggests that developmental stage theory has fundamentally mis-understood and conceptualised development in adulthhod.

The linear view of development posited of developmental stage theory is regarded as eminating from the definition of an end or final state which is held to represent mature, perfected cognitive functioning. Progression and regression are necessarily defined by such a superior final state/stage. Within developmental stage cognitive theory, the latter is regarded (by Labouvie-Vief) as being defined by formal logical criteria. Adolescence is typically marked by the onset of formal operational thinking and reasoning which is used to experiment with numerous logical possibilities. Labouvie-Vief argues that adulthood is not characterised by adolescent logical experimentation but rather by commitment and responsibility embedded within a particular social context. Thus whilst adolescence may involve resolving contradictions by formal logical processes, adulthood involves accepting contradictions and imperfection with a commitment to a single course of action in full awareness of other logical, but contradictory possibilities. Adulthood is therefore regarded as a reintegration of formal abstract logic and reasoning with pragmatic necessities and decisions. Adolescence is a necessary but preparatory period for the development of adult cognition and cognitive functioning. From this perspective therefore, it is erroneous to use formal logical criteria, which is the hallmark of adolescent cognition, to gauge adult cognitive functioning. Although the latter, when tested against formal logical criteria, represents decline and regression this is regarded as artificial and arising from the inappropriate use of an inferior and out of context standard of cognitive functioning and adaptation in adulthood.

All forms of cognitive functioning are held to be adaptive relative to the developmental context but because of the use of a pre-adult standard and therefore inappropriate developmental context adult cognitive functioning and adaptation has been mis-conceived and under-estimated. Labouvie-Vief suggests that developmental progression in adulthood may entail regression relative to adolescent formal logical criteria, but in terms of adaptation to the demands of the social context adults exist within such regression in formal ability is a "trade-off" yielding more adaptive and complex functioning. Cognitive stage developmental theory imposes an abstract and de-contextualised formal criteria which fails to reflect the competence and adaptiveness of adult functioning relative to that context.Labouvie-Vief notes that because social contexts are relative to the individual and are therefore numerous, the definition of social contexts and criteria for associated adaptation and cognitive functioning is far more complex and difficult than the universal, de-contextualised, formal logical criteria of earlier approaches imply. In essence, the nature of adult cognitive development and functioning according to Labouvie-Vief, has been mis-represented by the use of criteria more characteristic of a pre-adult form of cognition. Adult cognition and adaptation is regarded as superior to that of adolescence.

This view is similar to that of Riegel (1975) who argued for the existence of a fifth stage of cognitive development in adulthood. The dialectical emphasis upon the existence of contradictions in adulthood as opposed to resolving them in adolescence is clearly stated within Labouvie-Vief's paper. The fundamental feature of the latter is that such contradictions may be resolved in adolescence since they remain purely theoretical exercises whereas in adulthood commitment and action ensure that they cannot be resolved yet demand choices between logical possibilities. Also and a fundamental feature of this adaptive model, is that the distinction between social informal and formal logical thinking is removed. Adulthood represents a reintegration which necessarily involves the existence of contradictions.

# SECTION SIX

## Conclusions

From the above analysis a highly complex picture of theoretical approaches to teaching, learning and development in the adult and non-adult contexts emerges. Given this complexity it may be appropriate to consider some general principles or themes which underlie and integrate some of the perspectives and formulations considered earlier. Such principles and themes will also enable, and themselves represent, conclusions to be drawn or suggested from the preceeding analysis.

Three such themes/conclusions may be tentatively identified. These are;

a) epistemological,
b) professional and methodological,
c) conceptual.

### a) Epistemological

In terms of formal knowledge the existence of conceptual and theoretical complexity is to be expected and welcomed. A non-dynamic epistemological state would imply the absence of theoretical and conceptual complexity and sterile theory formulation. A determinist position would argue for the current existence and future explanation of such complexity the achievement of which would end the search for knowledge i.e. the discovery and explanation of all complexity renders impossible the further development of knowledge. Whether such a situation will, or can ever, occur has been the subject of some debate within philosophy (the Free Will vs Determinism argument). However, it has not occurred yet and most writers agree that the best approach to approximating truth (which according to Popper is the most that we can expect since to know the truth objectively amounts to predicting the future) is the generation and development of different hypotheses and interpretations of phenomena. This necessarily involves increasing complexity as earlier formulations are elaborated, extended, differentiated, modified and abandoned.

Although such complexity can often represent and create difficulties in understanding and comprehension it cannot be used as an excuse for not investigating phenomena which are necessarily complex. Generally, such complexity can be represented as either a vertical differentiation incorporating increasingly discrete, specific and detailed phenomena and concepts, a horizontal differentiation incorporating an increasing number of variables, parameters or perspectives leading to broader and more comprehensive conceptual approaches, or a combination of both. Examples of each of these can be found in the previous discussion and analysis. For example, the progressive differentiation of participant characteristics within the Contingency Model of teaching represents a vertical process of knowledge definition focussing upon more discrete and

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detailed aspects and concepts. The analysis did not penetrate beyond pointing out the existence of several different theories within each of the ways participants could be characterised, however, it would be possible to go beyond this level and find even more discrete and specific theories and phenomena within any given theory. An example of the horizontal differentiation of knowledge and phenomena can be found in the section on Models and Theories of Adult Development in that the historical development of such theories and models represents a transition from single dimensional to multi-dimensional interpretations. Riegel's dialectical theory and Baltes et.al.'s account of adult development clearly refer to the need to include a variety of developmental variables and influences in addition to the traditional biological variable. In a similar vein, life-cycle/phase theory demonstrates the logic and necessity of a sociological perspective in development in contrast to the purely psychological and biological characteristic of traditional approaches. As an example of both vertical and horizontal epistemological differentiation, life-cycle/phase theory not only suggests the need for a sociological perspective but also points out that this directly influences psychological phenomena at a micro level. Riegel also describes the interaction between biological, social, psychological and physical variables at a detailed level.

In this context it is also relevant to note that the dynamic, changing and developmental nature of knowledge itself reflects its approximate, tenatative, hypothetical and necessarily abstract and incomplete character. There is a paradox here, in that the growth of knowledge and the answers it confers begets a similarly growing body of questions. From this perspective the indication of epistemological development and progress is reflected in changes in the types of questions being asked rather than the absence of the need to ask questions. Again this feature of knowledge is apparent in the historical development of theories and models of teaching, learning and development at both macro and micro levels. As a further extension of this point, Riegel's theory would appear to be the only one which explicitly recognises the socio-cultural contexts within which epistemological developments occur. Knowledge may attempt to describe phenomena objectively but the conceptualisations and methodologies (including objectivity itself as a concept) it uses to do this derive from and reflect differing social contexts and their assumptions over time.

### b) Professional and Methodological

The tentative and uncertain nature of knowledge begs several questions concerning the objective, function and method of education itself, since the transmission and communication of knowledge would appear to be a minimal requirement for any definition of education. However, different interpretations of knowledge will have different implications for the content of education and how best its transmission and acquisition is effected. The problem resides in the definition of knowledge itself since at a given point in time different theoretical interpretations differ in what is to be counted as a "fact" or a phenomenon to be explained and that over time these competing explanations will be overtaken by or assimilated within later interpretations. There are many examples of this within the previous discussion of theories of teaching, learning and development.

Within the context of education the obvious requirement is to communicate the "state of the art" within a given area of knowledge via exposition of each of the major theories, the evidence and logical arguments supporting each of them relative to each other i.e. to seek the development of "critical analysis". This is the acceptable form of eclecticism and can be regarded as within the "mental discipline" and intellectual training tradition. However, this can be defined within a purely theoretical knowledge context and may not, and does not necessarily have to, have any bearing upon the practical application of such knowledge. Theoretical dsiciplines need only be guided, in terms of objective, purpose and direction, by the pursuit and state of the theoretical elaboration of their particular area of interest. Other disciplines (e.g. adult education, town planning, civil engineering, nursing) possess a more practical and vocational orientation which guides their objective, purpose and direction. The latter disciplines draw upon the knowledge content of the theoretical disciplines but focus and apply such knowledge upon the practical activities they are concerned with. For both types of disciplines teaching involves communicating the "state of the art" of the knowledge which defines them but the latter will be different due to their different natures and objectives. However, there is often a problem in translating theoretical knowledge into applied knowledge. This is to raise the problem of the theory/practice relationship.

The present paper has made no attempt to translate the theoretical knowledge it is concerned with into an applied form. As stated in the Introduction, its logic and rationale rests solely on the perceived need to increase the repertoire of theoretical interpretations of teaching, learning and development within the adult education context, i.e. it is theory driven. Whether and to what extent such knowledge can be applied to actual teaching practice is a question beyond the remit of the present paper, although some examples of this are given or referred to in the text. One problem encountered in the translation of theoretical knowledge is the presence of metaphysical assumptions built into theories which, theoretically, precludes the mixing of theories with different assumptions i.e. philosophical consistency. However, even at a theoretical level, many theories of adult development would appear to contain assumptions from different metaphysical models. Another problem is the narrow focus many theories adopt and which does not reflect the true complexity of multi-dimensional and multi-faceted phenomena. As discussed in Section Five, however, current theories of adult development are more pluralistic than earlier theories but are at such a general level that their usefulness both theoretically and possibly practically, has not been demonstrated. A similar criticism may be levelled at the Contingency Model of Teaching in that whilst the presence of a variety of variables demonstrates the uncertain and unpredictable nature of teaching such a position may logically defy a detailed practical formulation of anything other than the general principle of contingency. In this sense there is a dichotomy between detailed theoretical knowledge which is incomplete, and, general, comprehensive knowledge which, although recognising and describing the complexity of real phenomena, cannot (as yet) find expression at a detailed level. Another related problem is that many theories concentrate upon explanatory and predictive principles at an abstract rather than concrete level which results in their being narrow in the type of phenomena they are concerned with but general and abstract in their stipulations concerning this narrowly defined phenomena. A final problem resides in the apolitical and value-free nature of theoretical knowledge and the necessarily political and value ridden nature of practical and vocational activities. The existence of values in the latter seriously modifies and qualifies the definition and application of theoretically based objective facts.

From this perspective it may be too much to hope for the integration of theory and practice emanating from an essentially "theory driven" process and approach. As mentioned in the Introduction, several writers within the philosophy of education argue that education is a socio-practical activity and that whilst theoretical knowledge may be used and applied to practice the underlying ethos should change from a theoretical to a practical one. Instead of knowledge within education being "theory driven" with a consequently poor practice, it should become "practice driven" with emphasis upon the real problems faced and defined by practitioners. Within this approach the mixing of models is permissible since the objective is pragmatic solutions to real problems rather than theoretical consistency and elaboration for its own sake. Paradoxically, because such an approach involves an interface between theoretical knowledge and knowledge emanating from practice it may produce better and more effective theory.

### c) Conceptual

In virtually every instance in all of the foregoing sections the concept of interaction may be found. In the Contingency Model teaching is regarded as a function of the interaction between all the variables it depends upon. In the Non-Contingency Model, within any of the theories it specifies, teaching and learning can be regarded as a dynamic interaction between the conceptual entities each specifies (e.g. Behaviorism : reinforcement, environmental contingencies, practice, reactive organism, stimuli and responses; Humanistic subjective experience, perceptions, self-development, meaning, active organism). Similarly, the various theories of adult development invariably specify some form of interaction in which the staus of one variable or dimension is altered by others and reciprocally alters others in its turn. As mentioned previously, current theories of adult development also specify the notion of interaction between major aspects of human reality rather than restricting interaction to that within a specific aspect or area. This corresponds to the already noted increasing complexity of conceptualisations concerning learning, development and teaching. In a sense, all that is being stated is that phenomena do not exist within a vacum and for change to occur there must be some form of engagement or interaction with an environment. Current theories of adult development can be regarded as elaborating the interconnected nature of that environment and the complex and reciprocal interactions human organisms experience with it. In the same manner that the Contingency Model does not emphasise the importance of one variable at the expense of any other, current theories of adult development do not permit the emphasis of one source of developmetal change to the detriment of others. All are equally potent with particular ones gaining relatively more ascendency over the others as a function of time, individual circumstances and previous forms of interaction.

In a sense this amounts to the demise of the "main effect" models in which almost exclusive reliance was traditionally placed upon individual sources of explanation (e.g. the nature -nurture debate (biological/genetic vs environmental/learning influences)). Similarly, in explaining human behavior different accounts emphasised personalistic or situational variables, however these perspectives have been modified with the growing acceptance of dynamic interactionism in which both sets of variables are logically related and involved in a continuous and reciprocal interaction. Behavior at any one moment in time and within a given environment is a product of both sets of variables and their previous pattern of reciprocal interaction.

The emphasis upon dynamic interactionism within the developmental literature also echoes a central theme of the Contingency Model of teaching in that both refer to the essential existence of uncertainty. Developmentally, an individual is regarded as possessing a unique (apart from identical twins) genetotype which confers a particular pattern of interaction with the encountered environment. Within the process of dynamic interaction each of these sources of developmental change reciprocally alters each others' contribution to developmental outcome at a particular time. This process is unique to each individual since genotypes, environmental influences and the pattern of interaction resulting from them are all unique and cannot be predetermined a priori. Thus, developmental sequence for a particular individual is uncertain and unpredictable. Group level statements concerning developmental progressions can only be regarded as normative and general descriptions within which individual developmental sequences can be fund to vary at a detailed level. In this sense individual development is contingent. Similarly, the Contingency Model agues for a degree of uncertainty in the "how" of teaching since it is dependent upon a variety of interacting variables. Group level, general statements concerning the variables it depends upon (e.g. qualifications and work experience of students, age, sex, origin, type of subject, type of institution, etc.), may permit the derivation of general guidelines but they will not enable an accurate prediction of teaching experience with a particular group of students to be made. In this context Squires defines the skill of the teacher as the ability to respond to this uncertainty and to adapt and change the manner of teaching relative to the local constellation of contingent variables. As discussed previously, the formulations of different learning theories and theories of adult development and all the variables these depend upon can be regarded as falling within the conceptual remit of these contingent variables which affect teaching.

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